



FRIDAY, JAN. 16.

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Contributions.

The Election in the American Society of Civil Engineers.

ST. PAUL, MINN., Jan. 12, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The undersigned members of the Am. Soc. C. E., resident in St. Paul, desire to state that the action of the St. Louis gentlemen in issuing a circular to the society bearing our signatures was entirely unauthorized by us. We were requested to sign such a paper, but refrained therefrom, as entirely uncalled for. Our announcement of the ticket which we proposed to vote was unaccompanied by comment or reflection of any kind.

C. F. LOWETH,
W. W. CURTIS,
C. J. A. MORRIS.

[At 10:15 a. m. Thursday, as our pages are closing for the press, we receive a letter from Messrs. Johnson and Holman of St. Louis, protesting against our publication of Mr. Nichols' letter last week without publishing their circular, to which the letter was a reply. The circular is long and had already reached all members of the Am. Soc. C. E. Mr. Nichols' letter to have any effect must be published at once. Therefore we printed the latter and not the former. We have not thought it proper to give space to the numerous circulars which the canvass has brought out.—EDITOR RAILROAD GAZETTE.]

The Use of White Signal Lights.

The Johnson Railroad Signal Co.,
RAHWAY, N. J., Jan. 4, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have carefully read your editorial (Jan. 2) with reference to the use of white lights for all clear signals. The greatest argument against their use is, as you point out, the possibility of a collision by reason of the breakage of a colored glass placed in front of a white light for the purpose of giving a stop signal. If the report of the occurrence of a derailment on the Chicago & West Michigan from this cause is correct, it is the first accident of the kind which has come to my notice. As far as I know, the Board of Trade returns contain no report of such an accident, and I have often been told by some of the most prominent signal engineers in England that, to their knowledge, even with their hundreds of thousands of signal lamps, no such mishaps have taken place. I am inclined to think, therefore, that there is not much intrinsic importance in the question.

A question of more importance is the danger by reason of the obliteration of the light, combined with an engineer's forgetfulness of locality. Probably the best remedy is one suggested by Mr. Henry Johnson, in a report to the directors of the Lancashire & Yorkshire Railway, viz., the use of an automatic warning to the engineers, which would simply make them aware of the proximity of a signal applying to themselves.

ARTHUR H. JOHNSON.

Lenses or Illuminated Semaphores.

BOSTON, Jan. 13, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been greatly interested in reading your editorial on page 11 of your issue of Jan. 2 upon the subject of Colored vs. "White" Lights for All-Clear Signals, and the contribution of Mr. Arthur H. Johnson on page

19 of your issue of Jan. 9, entitled Lenses vs. Illuminated Blades.

It is much to be regretted that not only railroad men, but signal engineers and experts as well, are still so far from agreement on fundamentals which shall fix and establish as the standard of good practice a rational and consistent uniformity as regards color, form and position of signals, by day and by night. First, however, we must beware of drawing broad conclusions from insufficient premises, or basing a general rule on some sporadic or exceptional instance of practice. Thus, the fact that during a snowstorm the breaking of a red glass changed a danger into a safety signal does not prove that red should not be used for danger, but rather that the system was at fault which staked everything on color alone, when form and position might and should have been added. Nor can we discover virtue in the argument of your correspondent that merely because night differs from day, therefore we must, forsooth, necessarily have for night a different scheme of signals than for day, even though a better, that is, a uniform, system is ready to our hand. To such arguments we must reply: "Not proven; it does not necessarily follow."

In order to be systematic, however, let us return to your arguments against white-light signals and then glance at your correspondent's against the illuminated semaphore—a device which, as you say, has made encouraging progress, although you do not state which of its features are "still to be perfected." But, if the argument is sound that, inasmuch as some managers choose to stick to the old lamp signals simply because they are "old and well tried," therefore they should be perfected, may we not argue with even greater force that, if it has really been rendered possible for us to take a new step in the right direction, then the march of improvement should most assuredly be continued in that direction, and not backward?

But, *seriatim*, I. It is indeed an axiom, your statement that a signal should be distinctive; and in this period of electric lights, gas clusters, street reflectors, etc., a plain white light, no matter how brilliant, cannot be called a distinctive railroad signal. But, when an ordinary white switchlight can be easily seen for one or two miles, because no rays are intercepted and weakened by colored glass, it would seem that the illuminated semaphore's inclined, vivid, white streak or broad band of untrammelled light could not only be seen farther than any colored light, but, by its form and position, in fact its very strangeness, would most emphatically fulfill your fundamental requirement of distinctiveness, whether set high or low.

2. Are we obliged to take the position that, because hundreds of switchlights are said to be passed by engineers "without seeing them," therefore, and for that reason, white must be abandoned? Would such engineers be any more likely to regard the green light? If the argument has any force, it is in favor of changing the form of your white light, making it more striking and eye-catching. But let us not believe that the careless habits of runners are to destroy the force and control of a well-considered scheme of signals. As to using green for a "clear" signal, it is true that it is often used in switch lights to show main track; but it is in that case not quite synonymous, or rather *synoptical*, with white light, since it still has a cautionary value; for it informs the engineer that he is approaching a switch—right for main track, if true, but with its frog, still a possible chance (remote, let us hope) of danger, so that, though not often calling for reduced speed, it should none the less awaken in his mind wariness and vigilance; wherefore its signal may reasonably be different from the white safety signal, which unequivocally commands him to proceed at speed.

3. Red and green, being complementary and therefore opposite colors, are more strongly contrasted than either green with blue or red with purple. Blue is used on some roads as a cautionary signal for spacing trains particularly where green is used instead of white for switch lights. If, however, a satisfactory white safety signal, conspicuous and distinctive, can be had, then green for safety and red for danger cannot be improved upon, there being greater contrast between the two than between any other available colors, their penetrative power also being greater, while each of them is clearly differentiated from white.

4. It is true that one reason for using a white all-clear signal by night is because the same is used by day; but, if color is to be used at all by day, what can be better than white to indicate safety? And while in common parlance white is called a color, yet, scientifically speaking, so far from its being the "absence of color," it is in reality the sum of all colors; and that reasoning would appear to be of doubtful validity and rather far fetched which would reverse the present system and make white indicate danger, and, conversely, red mean safety, merely on the ground that white is the absence of color, and so may mean the absence of a signal; would this not be a tail-wagging-the-dog theory? It will be a long time, doubtless, before the average man will fail to associate blood, disaster and danger with the strong and startling red, and good cheer, comfort and safety with the clear and attractive white, so that in adopting a scheme of colors for signals we have every reason for being in harmony with the natural workings of the mind in its association of ideas.

These thoughts would only seem to emphasize what we are coming to regard as the best principles of practice, namely, that color and form (or position) should be used simultaneously, one being a check upon the other, it being practically impossible that, when thus used, both should give a wrong signal at the same time.

As to the correct position taken by Mr. Johnson that night time offers a better background for lights, we may observe that, since he is unquestionably an advocate of the semaphore system by day, his own argument would be all the more forcible in favor of using illuminated semaphores by night, since they then show to striking advantage against the darkness. The writer's experience is that even with a "background of town lights," including electric lights, the illuminated semaphore admirably holds its own and fully maintains its distinctive character, whether in horizontal or inclined position, particularly if the first position be combined with red color and the latter with white; neither has there ever been any difficulty in determining the angle of the blade, since the eye at once recognizes a horizontal line and all semaphores are naturally so placed that there can be no possible error on account of "perspective." Furthermore, the post, being painted white, soon "shows up" under the head-light.

As to the possibility of the parabolic semaphore, in its inclined position, having a tendency, when connections are broken, to remain at safety by any assumed weight of snow then lodged upon the blade, disregarding the mechanical improbability of such a case ever happening (which is foreign to experience), a simple mathematical calculation would show the impossibility of getting snow enough to stay on the blade, even with the increased leverage, to offset the heavy counterweight; and what little snow might fall upon the end of the blade (even could it stick there), while temporarily at safety, would quickly be shaken off when it is jerked back to its normal position. Anyhow, our recent experience with a mild New England blizzard has failed to develop even the ghost of such a phenomenon. The rare accident of the colored glass falling out or breaking can, as has been heretofore said, be effectually provided against by insisting that the form or position, no less than the color, shall define the meaning of the signal.

Upon the whole, may we not look for weightier reasons than have been advanced, before departing from the principles which have been so long tried, seeking rather to adapt those principles to our new methods of signaling, combining form or position with color and securing not only uniformity in day and night signals, but at the same time the greatest possible contrast between signals differing in signification?

C. A. HAMMOND.

Safety in Car Coupling.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your issue of December 26, 1890, had a communication "Uniformity is Safety." Now uniformity may be secured by the continued use of a very poor or unsafe appliance. The argument of this communication seems to be based upon the supposition that every thing now done by brakemen is a necessity in the successful coupling of cars; that there is no way to remove or reduce the risks but by the universal panacea of an automatic coupler. The writer says: "Can this (safety) be secured if there is a multiplicity, say, of automatic couplers? If couplers are automatic and still not safe, where is the argument for the introduction of automatic couplers? Again he says: "Is not uniformity of more importance than actual perfection at first in an automatic coupler?" Answering one question with another, what can possibly be better than perfection in an automatic coupler first, last and all the time?

Again: "Should not a brakeman or yardman have a right to expect that every freight car he is required to couple or uncouple will have a coupler just like the last one he handled?" It does not look practical unless, indeed, the power which makes the law purchases the best patent coupler and allows every one to use it without royalty or charge other than the material and labor to make the coupler. Besides, with proper care it is not necessary to safety that couplers be identical.

Again: "Should not the law require the M. C. B. coupler should be unlocked by the same device, etc.?" It would seem from this last question that there is a chance for a grinding monopoly in the M. C. B. coupler yet, and if this suggestion were carried out there would be a very pretty fortune in it for the man who secured the adoption of his device. There must be differences if a man can protect his device by the patent laws. Besides, such action would put a stop to any improvement which might be made in time. Surely no one will claim that the M. C. B. coupler is not susceptible of any improvement. Perfection is a plant of slow growth, and the proposed restriction would put a stop to any chance for improvement.

Couplers of the same kind do not always occupy the same position. The difference between loaded and empty cars makes a difference in the height of draw-heads.

The letter referred to says: "Is it not due to the men that they may calculate with perfect confidence on the fact that there will be uniformity in couplers of freight cars?" Answering this question by another, is it not due to the railroads and to the law of self-preservation that the men should take pains to investigate, before

taking personal risk, the kind and condition of couplers, and if in doubt stop the cars so that they can examine them without danger? No man has a right to expect a special Providence made for him, or that in spite of his own carelessness "He shall give his angels charge concerning him lest he dash his foot against a stone." The duty of exercising due care is a personal one. It can not be delegated to any one. Each man must exercise it for himself, and if he fails to do so he must expect sooner or later to pay the penalty of his neglect. It seems to be the fashion now to assume that railroads must take all the care. Illustrating this, the writer is told that on one occasion when a person neglected the caution of closed crossing gates and dodged under them in the face of a passing train, paying the penalty of his carelessness with his life, a member of the legislature gravely proposed a law that railroads must build a gate which could not be got over, under or around.

None of these reformers or coupler cranks have ever within the writer's knowledge advocated passing a law providing that men coupling cars shall take the time to examine couplings to know that they were safe and use a stick to guide the links. It is as easy to make a penalty for disobedience of such a law as to make a penalty for walking on the tracks of a railroad, as is the case in some countries across the water. Railroad companies have issued such orders to brakemen, but in most cases they had about as much effect as the "Pope's bull against the comet."

The real facts are that there is no shadow of doubt that by far the larger number of injuries in coupling cars are the result of neglect of any precaution on the part of the men. Men take risks and do not seem to think they are taking risks until the consequences overtake them. The duty of an employe to use proper care for his own safety seems to be lost sight of by the people, by courts, juries and law makers. Years ago, in discussing with conductors and brakemen the matter of safety in making couplings by using a coupling stick, I have been frequently told by conductors that they would not have a man on their trains who would use a stick. The brakemen themselves had a feeling that using a coupling stick looked "green," showed a "tenderfoot" not posted in the business. There is very little doubt that the same feeling prevails now among the men on many roads. It is true that to make the necessary examinations of couplers and to use a stick will probably make more misses in connecting cars and so cost more time; but the added safety is worth the time (to the men) surely. The time gained by neglecting this plain duty is not worth the risk involved.

I feel that I have a right from experience to speak freely on this subject, not that I do not feel for any one injured in coupling cars, but because it is fair to present the truth of the case to the public, and give opinions which are the result of my own experience. My first lesson was in March, 1854, the first day I received pay for working on a railroad (by the way, it was a night trip), on the third (mountain) division of the B. & O. The conductor, seeing that I was a "tenderfoot" looking for a stick to make a coupling with, said he would make it. He did not use a stick, but put in his hand, and it was caught between the drawheads. Fortunately, it was an easy catch, no bones broken, not even the skin broken, but all the same the bruise laid him up two or three weeks. This lesson never was forgotten. The second lesson was some years after; caught between an engine and a car; cause not noticing how close engine and car came together; result, two or three crushed ribs; lucky it was no worse. There were other reminders in his experience, but it is not worth while to say anything about them now.

SENEX.

Proportions of Class Fares in England.

The proportions given in some recent articles in the *Railroad Gazette* are scarcely correctly given as 4, 3 and 2 cents per mile for first, second and third class. Speaking generally, the third class fare is for short distances 2 cents per mile, though in some cases it is less than this and in others more. Fares less than 2 cents a mile are found on the Great Eastern Railway, which heads the list for punctuality and attention to the traveling public, while a rate higher than 2 cents occurs on the Great Western, which, except the lines south of London, has the worst reputation of any main line in England.

As a specimen of class proportions, take the distance of 185 miles, London and Manchester. The fares by all three lines (the distance is 203½ by one route) are as follows: First, \$5.88; second, \$4.80; third, \$3.71. To Liverpool, 201 miles, fares are \$6.98, \$5.22, \$3.96. As an average, I have added up the fares from London to a few places chosen at random thus. From the A. B. C. guide I take the first place on every 12th page, and take a mean of the lot. So figured out, the total mileage of 22 places comes out close on 2,000 miles. The mean fares figure out per mile to 1.917 cents, third; 3.017 cents, second, and 3.976 cents, first class. The second alone is not exact, as I have had to assume a fare in two cases where none are given. This list includes quite a number of Great Western fares, on which line the first class is most always over double the third class fare, and Dover also came into the list of the first class fare, which is treble the third class fare, for some reason known to the genius of the manager only. Again, taking the third place on every 50th page,

we get five places at a distance of in all 975½ miles, the mean fares to which figure out at 3.23, 2.59, and 1.93 cents per mile. This latter list happened to include no Great Western station, or station south of London, and on the whole I should incline to believe the ratio of fares is more reliable for the country at large than the previous list shows.

There is no proportion, however, between the fares of the different classes on any line. Comparison of the fare boards at every station will reveal numerous discrepancies. There is a practice, too, on some lines of having cheap days, perhaps once a week. On this day fares to and from a large town are reduced very considerably. Some lines charge double fare for return journeys; others make a considerable reduction for the double journey.

The longest journey possible from London is to Thurso—a distance of 747½ miles. To this place the first class fare is much over double the third class fare, but the third class fare is only 1.7 cents per mile, while the Great Western charges 1.9 cents on its longest journey, to Penzance—a distance of 328 miles. As, however, the bulk of journeys are short, it may be taken that an average fare is under 2 cents a mile for third class for all journeys, seeing that for long journeys the third class gets an advantage. For ordinary journeys the first class fare is considerably under 4 cents on all the well-managed lines—in fact, anywhere except the South of England, where railway management is at its lowest ebb.

It is a curious fact that all the lines running out of this, the largest city in the world, which have no connection with the North of England are simply disgraceful in rolling stock, punctuality and general management. There are cars running on those lines which must be quite 50 years of age, and yet the president (as he would be termed in America) of one of these southern lines has the effrontery to stand on public platforms to push a scheme for a Channel tunnel, though he cannot run a train on schedule or make revenue enough to abolish worn-out cars. Nothing on even the French lines comes up to those southern lines in slowness, discomfort or unpunctuality, and it is on these lines that the public pay the highest rates.

Since the foregoing was written my copy of the *Railroad Gazette* has come to hand in which "Doubter" seems to question the comparative lowness of English rates. Dr. Behrends is very seriously out in giving the English average at 4.42 cents, for this is not even the average of the first class fares, which constitute about 10 per cent. only of passengers or less.

The actual English average is less even than I have given it. Apart from what you would term commutation rates (season or contract here) there are run early morning trains specially for the convenience of workmen at much lower rates on day tickets. In London especially thousands are thus conveyed before 8 a. m., especially on the East London lines. I cannot give the proportion of fares, but they are much lower than ordinary. The average also is considerably reduced by return tickets. These are not now granted on some lines at less than two single journeys, but on many lines they are still in vogue. A return fare when granted at a reduction will be granted at the rate of, say, 36 cents for a double 21-cent journey, and a first class return fare occurs to me as I write in which three shillings pays for two two shilling journeys.

At one time there were four fares on all lines, viz.: first, second, third and parliamentary, the last named being two cents a mile as a maximum fare on at least one train per day each way over the line, as ordered by Parliament. Years back, before the Midland Railway showed the way, the third class rates were higher than the parliamentary by the amount of the passenger duty not charged on the enforced rates. Now most lines have abolished the old third class fares and charge the parliamentary rate for all third class. The Great Western do not, hence some of their trains are run at higher third fares than others. The London & North-western has now, I believe, abolished the higher third rates, as it came so much into competition with the more advanced Midland and other lines.

Practically there is no cutting of rates as known in America. Three lines between two large towns all charge exactly the same fare to a cent, though their distances are different. Thus, between London and Manchester the distance is given in one guide as 183½, 185 and 203½. The fare is 185½ pence each way. Probably the 183½ is an error, for the fare is in excess of 2 cents a mile on that line, which thus appears to be illegally overcharging.

There are a few trains, more especially in Ireland, on which extra or special express fares are charged considerably in excess of ordinary fares. Notably, from Dublin to Cork, the 9 a. m. carrying the American mails is a special fare train.

ENGLISHMAN.

Progress of the Hudson River Tunnel.

BY CHARLES H. PAINE, C. E.

The completed length of the Hudson River tunnel is now nearly 2,800 ft., which is a little more than half the entire distance to be covered. Work is progressing at an average rate of 6 ft. 8 in. a day; the highest record so far being 50 ft. in one week.

The shield was fully described in the *Railroad Gazette* of March 14, 1890, and is very similar to the one em-

ployed at the St. Clair tunnel. In place of two large openings, however, it has nine small ones through which the silt is forced as the shield is advanced by the hydraulic jacks. Originally these openings were closed by swinging doors, but these, being found unnecessary, have been laid aside until softer material is met with. The material excavated continues to be of uniform texture, having a soapy, soft feeling in the hand, but stiff enough to stand of itself. There are 16 jacks, each having a capacity of 100 tons. Formerly the power was furnished by an accumulator at a pressure of 1,100 lbs., and the rate of advance was very slow; now, however, the pumps are arranged to act directly upon the jacks at a pressure of 3,500 pounds, and the only problem is how to get the mud out of the way.

This is really a serious question which deserves, and is receiving, attention. It has been proposed to use a system of chutes by which to carry the material excavated from each opening directly to the cars instead of shoveling by hand, which is very laborious and slow in this limited space. Another plan which suggests itself would be to suspend a tray below the openings in such a way as to receive the material as it falls in. This tray could then be raised and run back out of the way so that the work of erecting the lining and that of loading the cars could be carried on simultaneously. Of course the obstacle to any plan requiring machinery is the want of room in which to operate it.

The shield in advancing has undergone a rotary movement, so that the upright partitions stand about 15 degrees out of the perpendicular. An effort will be made to rectify this, although the utility of the shield is not now impaired. This same twisting was observed in the two shields used at the St. Clair tunnel and also in the one used in the construction of the City of London & Southwark Subway. This latter was the first of these shields to be used, and was designed in detail, together with the hydraulic arrangements, by Mr. E. W. Moir, under the approval of Sir Benjamin Baker.

The cast iron lining has been frequently described and must be very generally understood. A ring or section of the lining consists of 12 segments, of which 11 are equal in size and form; the remaining one is short and acts as a key to the arch. It was intended to keep this key in the vertical centre of the tube, but it has now worked several inches to the north. This is being corrected by having the holes on one side of the plates moved around one-quarter of an inch. This twisting also took place in the St. Clair tunnel, but no effort was made to correct it.

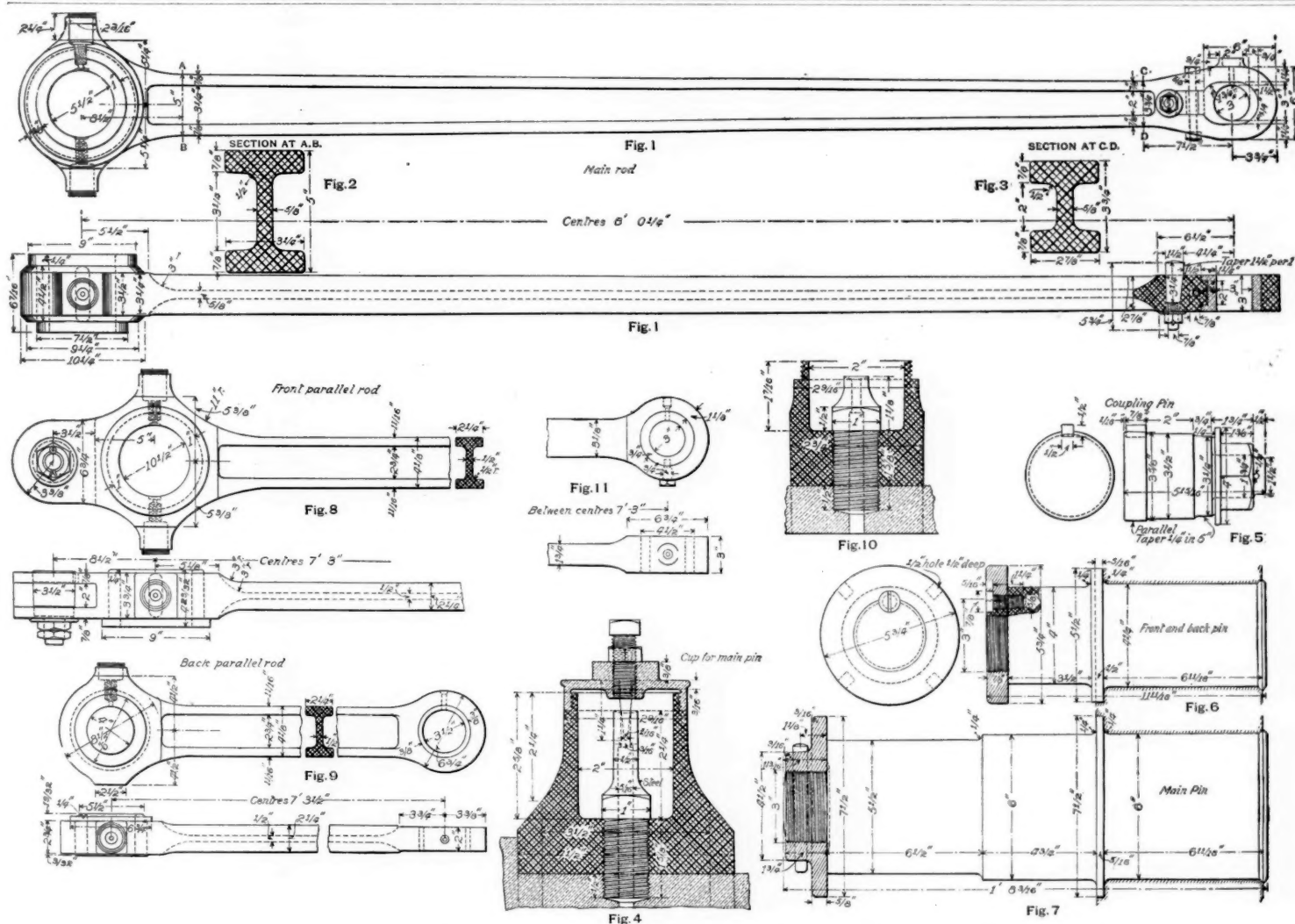
In erecting a ring the lower segments are put in position first, one lying fairly across the bottom. Only so many bolts are put in the vertical joints at first as will suffice to hold the segments in place. The ends of each segment are planed smooth and the horizontal joints are made tight by means of a sheet of asphaltum paper similar to that used for roofing, which is introduced between the ends of the segments. The bolts in these horizontal joints are then tightened, the key at the top of the ring being placed in position and bolted last. When the ring is completed the vertical flanges are bolted up in full to the adjoining ring, but without any packing. All vertical joints are afterward calked with oakum and filled in with hydraulic cement nearly pure. The pressure of the jacks against the ring at the end of the lining is found to loosen the nuts on the last row of bolts, though none of the previous joints are affected. To avoid cracking the cement filling this work is kept back a few spaces from the end.

To facilitate handling the heavy segments an ingenious traveling crane is provided. This consists of three iron girders extending across the tunnel midway of its height. The girders are braced together and mounted on wheels forming a car, which travels on rails supported by brackets which are temporarily bolted to the lining for a few feet back of the shield. Through the centre of this car runs a shaft which is kept exactly in the centre line of the tunnel and on which are mounted a drum and a radial lifting arm. The drum is revolved by chains attached to rams and gives to the arm a motion like that of the hand of a clock. Another ram extends or withdraws the arm radially so that a piece once delivered within reach of the crane can be quickly placed in position and held there till secured.

A change in grade or alignment is effected by advancing some of the jacks more than others, so as to alter the direction of the shield. At present the grade is running up and the lower jacks are 9 in. in advance of the upper ones. For changes in alignment special curved castings are furnished, but for changes in grade the bend is obtained by means of gaskets placed in the joints.

The excavated material is drawn out on iron truck cars which are passed through the three air locks to the shaft, where they are lifted to the surface and run to the dumping ground by gravity. The materials used in construction are kept at the surface and sent in to the work on the otherwise empty trucks only as required. Ample telephonic communication is maintained between the working face and the various departments above ground. It is fully expected that rock will be encountered near the New York side, but it is not yet decided whether an attempt shall be made to pierce the rock by means of this shield or carry the work through it from the New York heading.

The contractors are Messrs. S. Pearson & Son, of Lon-



CONNECTING RODS AND CRANK PINS, CLASS "H" ENGINE—CHICAGO, BURLINGTON & QUINCY RAILROAD.

don; Mr. E. W. Moir is engineer and agent for the contractors. Mr. H. Hinds is assistant engineer on the works.

Connecting Rods and Crank Pins for Class "H" Engine, Chicago, Burlington & Quincy Railroad.

The Class "H" engine on the C., B. & Q. has attracted considerable attention for two reasons; one, the superior design of its details, the other the use of a two-wheel pony truck for high speeds. We have in the past referred to this engine at different times, and we now show the main rod together with the parallel rods and crank pins, which are interesting; the main rod particularly has some novel features.

The back end of the main rod, see fig. 1, is probably the lightest for equal strength of any yet designed for a 5½-in. pin. This is due largely to the style of finish of the hub at the end. It is neat and fulfills all requisites of strength. The formation of the oil cup integral with the rod, shown also in detail at fig. 4, gives the rod a remarkably fine appearance, and does not add materially to the cost. The method of holding the brass in position by means of the dowel in the oil cup is shown in fig. 4. At the front end of the rod there is a key and nut take-up, which probably will always be necessary in high-speed engines to prevent pounding at the cross-head end; but at the back end a take-up has not been found necessary, and before us is a rod with such a back end that has been running for over six months without giving the least trouble. The removal of keys from this end of the rod is a decided advantage, and if no practical inconveniences result the plain ends for rear ends of main rods will become as general as they are for parallel rods. A solid front end has proved a success on the class "G" switching engine on the Burlington. Fig. 11 shows the design used on those engines, and after one year's service the bushing has been increased in interior diameter but ⅛ of an inch.

The designs of the crank pins used with these rods for the class "H" and also for the coupling pins for the knuckle joint connections are shown in fig. 5, 6 and 7. They are of steel, and so well shown on the drawings as to require no further description.

Figs. 8 and 9 show the parallel rods and fig. 10 the oil cup made integral with those rods.

It will be noticed that all of these rods have an I section, which has been calculated by the method given below. The advantage of this main rod in point of weight over rods with straps is clearly considerable. The same design with straps weighs 437 lbs., while the one shown weighs but 311, a difference of 126 lbs. in favor of this design. This is no small matter when the counterbalancing is considered, as we have repeatedly

shown. This rod has been in service with this section for a long time, and has proved to be amply strong—when made of steel according to the specifications, that is, with a maximum strength of 75,000 per sq. in.

The saving in the weight of the cross-head end of this main rod, by the use of the design shown, is about 4½ lbs. The class "H" engine, as most of our readers know, is a 19 × 24 mogul, with 62 or 68 in. drivers, weighing when fully loaded 110,000 lbs., with 91,500 lbs. on drivers.

Method of Calculation of Main Rod.

This rod is considered as:

First—A column with loose ends compressed in the direction of its length, having a possible deflection in the vertical plane, and a possible buckling in a horizontal plane.

Second—As a horizontal beam loaded with a triangular shaped load due to the centrifugal force, and a uniformly distributed load due to the weight of the rod. The moment of inertia of the rod at the point of maximum strain is 4.25. The modulus of elasticity of the steel used, by experiment in the Aurora laboratory, equals 27,000,000 = E.

The square of the length of the rod in inches = 9,264 = L. The greatest pressure on the main rod endwise is found to be 57,000 lbs.

Substituting these values in the formula for factor of safety given by Reuleaux, viz.:

$$\frac{\pi^2 J E}{L P^2}$$

the result is 2.15 as the factor of safety when the engine is starting; that is, with the greatest end pressure. The usual factor of safety according to Reuleaux for main rods varies from 1½ to 2, according to the design.

Considering the rod as a horizontal beam, loaded as described above, the top and bottom fibres are found to be strained to 10,000 lbs. per sq. in. at 70 miles per hour. It would be interesting to know the comparative extreme fibre stresses and weights of other main rods for this size of engine, and we believe it would be found that the rods illustrated herewith have less total weight in proportion to their ultimate strength than any other rods used on engines having the same weight on drivers and same diameter of cylinders and driving wheels as the class "H."

Notes on French Locomotives and their Every-Day Working.

I.

BY CHARLES R. KING.

Of the railroad companies to which are conceded the powers for working the lines that intersect the various

departments of France, there are seven great roads, familiar, by name at least, to every one; and out of these there are two that do not enter Paris. These are the Chemin de Fer de l'Etat, whose nearest approach to the capital is Chartres, 55 miles distant, and the Chemin de Fer du Midi, which line is confined solely to the south of France, starting from Bordeaux. Each line builds a standard type of express engine peculiarly its own, excepting perhaps the Chemin de Fer de l'Etat and the Paris-Orleans. The locomotives of the northern and western sections have an English appearance; those of the eastern are somewhat like the Austrian, and those of the southern roads are thoroughly and peculiarly French. An idea might have been obtained of these engines at the Exposition of 1888; but those exhibited, were, as a rule, the first of new types and not altogether representative of regular practice of French lines. To more fully show the differences in design of the standard French engines, several cuts taken from photographs are given herewith.

French locomotive engineers are by no means content with their engines or roadbeds, and they are laboring to attain results equal to the best foreign as far as possible without incurring great expense. A visit to French shops or offices always finds experiments in progress, either on paper, by models, or in full-size apparatus in the shops under pressure of steam or air. Probably no engineers in the world make such careful preliminary tests.

The fireboxes are almost always entirely of copper, and few roads have introduced the fire-brick arch as a standard practice. Some have used them for perhaps 10 years and still go on fitting them to some of the old fireboxes. Others have given them a trial for not half that time, and their engineers are doubtful or divided as to whether the thin places occurring around the screwed stays under the arch (where the heat is excessive) do not cost in shop repairs what the arch saves in fuel. Some have renounced the water table or Tenbrink device (so called in France after the inventor), but two French roads at least have reintroduced this copper midfeather on a considerable scale.

French coal is very bad—largely dust, excepting where it is agglomerated into bricks—and one might imagine an arch of some sort to be the very best thing to stop the clouds of fine coal that are ordinarily drawn through the chimney, especially at starting or when firing on up-grades. The shallow Belpaire firebox is a pattern that has been largely followed for years past, but the tendency now seems to be to deepen the space below the fire door by lowering the grade. That a deep box of the English pattern, when it is of large dimensions, consumes the coal more thoroughly, has been noticed by the writer when riding on the sister engine to the one shown

by the Chemin de Fer de l'Ouest at the exhibition. This was while hauling very light trains with the thinnest of fires, and the ordinary result in firing was that the fine dust in every shovelful of coal thrown into the deep space under the brick arch was instantly converted into a whirl of flame (through the great capacity of the box for free oxygen), and in many cases not a trace of smoke appeared at the chimney. Very different was the effect noticed ordinarily with other engines whose small boxes were crowded with coal up to the fire door ring during the whole run, so that at the first entry of coal the smaller particles were, quite naturally, drawn through the tubes unconsumed. Regarding deep boxes, we may expect to hear something of an extraordinary engine, or series of engines, to be built by the Chemins de Fer de l'Est, in which the boiler will have its interior diameter completely filled with tubes.

The types of French engines may be classified thus: Standard express; always four connected with single leading wheels or a bogie truck, or single leading wheels with or without a pair behind or under the firebox. Engines with one pair of drivers are seldom seen. All that remain are the old Cramptons and an experimental engine here and there.

Mixed freight engines are six connected; sometimes they have a short, fixed tender, supported by a single, radial, two wheel truck or a four wheel truck.

Moguls are extremely rare. There are old types that have been running for years with four connected driving wheels and a fixed pair of trailing wheels.

Suburban engines always have side tanks, are generally four connected with a single leading pair of wheels. A more recent model has six connected wheels only, and the briquette fuel is carried on the arch of the firebox casing instead of behind in a bunker.

Freight engines are mostly six coupled, without trucks, some roads having a few with eight wheels coupled. The latter are noticed more particularly on the Nord, Midi, l'Etat, Paris-Orleans, and Paris, Lyons et Méditerranée. Ten wheels coupled are unknown, although there formerly existed a type of four cylinder, 12-wheeled freight engine; wheels connected in two groups.

Tenders are more often four than six wheeled, and two Southern roads have a practice of placing the rear and middle axles nearer together than the front and middle. Generally they have no outside platform for the runners to walk upon.

Screw reversing gear with index finger and graduated is an old French practice, and is most generally used. For express engines, all roads running southward from Paris prefer outside cylinders, eccentrics and valve gear. The eastern roads prefer the same, but covered up by an outside framing. The western and northern alone have inside cylinders and eccentrics. For freight service, and very often for mixed traffic, outside cylinders are almost universal. The neat cast iron chimneys, so long used in Belgium, and seen for some time in England, have not appeared here, excepting, perhaps, where the machines have been built in Belgium, say, at the works of Tubize.

CHEMIN DE FER DU NORD.

The Chemin de Fer du Nord was the first to use the four-wheeled truck under the front ends of engines, and by them it is much liked.

Fig. 1 represents the standard express engines of the Chemin de Fer du Nord. They haul the fastest regular traffic on the longest daily runs made in France. Appearing in 1876, over 50 have been built up to the present

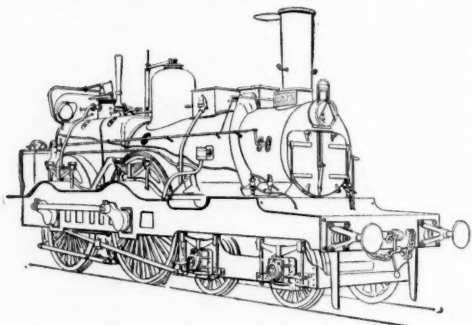


Fig. 1.—Standard Express—Chemin de Fer du Nord.

time, and until last year no attempt had been made to supplant them with a different type, which is proof enough of their utility in face of the increasing demands that have been made and are now being made upon them. As they are really the ideal type of high speed French locomotive, they warrant some remark.

The model of this engine was taken from a very excellent class of four connected locomotive at that time (1873) working on the (English) Great Northern road. Mr. Delebecque, the then chief of traction of the Nord (now M. du Bousquet), approved the design worked out by his engineers, and the Alsacienne Société des Constructions Mécaniques built the first according to their own details. These had single leading wheels, and altogether 103 of this series were constructed. The single pair of leading wheels, whether fixed or radial, are now being replaced with the "Nord" bogie. The reason given is that it decreases the cost of maintenance. (The four cylinder compound, illustrated in the Railroad Ga-

zette, page 3, 1890, will give some idea of the general lines of the type of "single leaders" referred to.)

The first four wheel truck was run under in 1876. Two years later the series became famous by the exhibition of one in the Paris Exposition of 1878. Following are their principal dimensions:

Cylinders, 16.9 in. to 17.7 in. x 24 in.
Driving wheels, 82½ in. diam.
Tubes, 201 (1.7 in. outside diameter), 11 ft. 4 in. long.
Boiler diameter, 48½ in.
Grate area (40 in. x 89 in.), 24.7 sq. ft.
Total heating surface, 1,069 sq. ft.
Boiler pressure, 156 lbs. per sq. in.
Weight, empty, 86,600 lbs.; loaded, 94,600 lbs.
Weight for adhesion, 61,600 lbs.
Total wheel base, 20 ft. 7 in.
Coal, per mile, according to load, 35 lbs. to 42 lbs.

Of the actual running of these engines, the writer had several opportunities to judge during the past summer through the courtesy of the principal engineer at the Paris shops, M. Sauvage.

The running of the well-known four-cylinder compound recently constructed by this line was shown to the writer in a run from Paris to Amiens, a distance of 81½ miles, which was covered in two hours, with one short stop at Cecil Junction. Its load was 12 carriages, or nearly 150 tons, using about 33 lbs. of coal per mile, or less than 1 lb. below that of a single expansion engine drawing the same train. The grate area is 23 sq. ft.

In starting, the compound gets away quickly enough and occasional slipping is easily checked by the Gresham sand ejector; slipping is said to be due to the wheels not being coupled. Once under way the exhaust, which is only faintly audible at starting, becomes unobservable to ear or to sight. Ordinarily the Northern engines have a simple vertical screw wheel and catch for working the links. This engine has lever and wheel combined, and the scale is graded 1 to 10; the position of the index finger was generally at 5; the runner, like a great many other drivers, apparently preferring to work the engine by the regulator. The pressure gauges are marked with a red line for the normal pressure, which, in the engine, is 156 lbs.; from this figure, the needle never dropped below 140 lbs. This, however, is not general; other engines sometimes arriving at Amiens (where they are ordinarily changed) with only 126 lbs.

The ordinary form of fire door is hinged and has a chain attached for the driver to hold while the fireman works the coal. On the compound the firing was attended to every three or four minutes with as many rounds from a small shovel about 9 in. square. The coal used was little better than powder, but other engines have a quantity of briquettes mixed with this fine coal. One thing particularly strikes any one used to large, clean coal, and that is the incessant use of rubber hose for sprinkling the deck and coals. On a dry day the hose is as often in a fireman's hands as the shovel; and there is need for it, as in a very few minutes after sprinkling the dust rises again. Some of the firemen who fill up their boxes every 10 to 12 minutes are equally infrequent with the spraying and flood the engine and tender floor with water when they start.

The Nord engines have cab cylinder oilers, automatic vacuum brake, and an electric communicator, so that when the driver is unable to see his signals he can ascertain if the way is clear. The road is laid with contact blocks or "crocodiles" at intervals, and to these the semaphore levers are connected by an electric current so arranged that the brush beneath the engine, passing over the crocodile's brass back, takes the current if the signal is against the train and causes the application of the automatic brake with or without the driver's aid, or calls attention by means of an electro-automatic whistle on trains not fitted with vacuum brakes. A foot-board is hung on springs attached to either side of the cab, but as this board is often dropped off its hooks, it is evidently not universally liked by the runners.

Returning to Paris on an engine of the type illustrated, the experience was very different. It was a heavy train from Calais running against a strong oblique wind, the regulator wide open and the screw block almost, if not fully, forward, while the exhaust maintained a heavy pull on the fire nearly the whole way. Firing was required every two to three minutes. Just north of Cecil Junction there is a grade through a cutting, and when running down this with the regulator closed, the blower on and the dampers open, the smoke from the firebox is troublesome until the station is passed through at walking pace.

The scanty foot plate coverings are bad enough in rough weather, but French runners seem to prefer them to being shut in in a hot, smoky cab. Controlling the exhaust by the valve on the pipe nozzle is part of the fireman's work before and after each firing. Just before reaching Paris very high speeds are made on the down grades, and the city is reached in one hour, 50 minutes, or 44 miles per hour, including slackenings for road repairs, etc.

This, being a daily run, does not of course compare to the trip made by a train of 320 tons on July 16, 1890, when the new engine, 2,101, took the Paris-Calais train of 17 cars over this section in 1½ hours, or 50 miles per hour.

CHEMIN DE FER DE L'ETAT.

Fig. 2 shows a Chemin de Fer de l'Etat express engine. The principal dimensions are:

Cylinders, 17 x 23½ in.
Driving wheels, diameter, 79 in.
Heating surface (firebox 93 sq. ft.), total, 1,193 sq. ft.
Grate area, 18½ sq. ft.
Weight on drivers, 59,400 lbs.

Total weight empty, 41 tons.

Boiler, diameter, 38 in.

158 tubes, length 16 ft. 4 in.

Boiler pressure, 169 lbs.

Coal, 23 lbs. per train mile; and 20 lbs. per mile per 100 tons

over numerous grades of 1 in 66.

The engine illustrated was built at the works of Schneider & Company, Creusot, and all freight or passen-

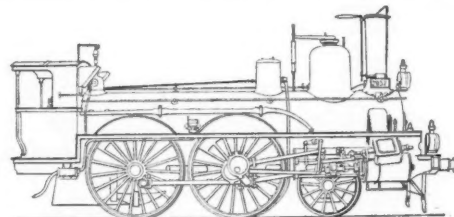


Fig. 2.—Standard Express—Chemin de Fer de l'Etat.

ger locomotives coming from the same constructors are finished in the simple and substantial manner for which the Creusot company is so well known on the Continent.

There is a peculiarity of the valves (Thomas Ricour's) which has, until lately, been used on all passenger engines. These are cylindrical valves having two pistons on one rod and completely balanced. A visit to the terminal yard at Chartres seemed to show that the ordinary type of valve will be substituted for the cylindrical distributor despite its apparent advantages.

The engine, now well known, with Bonnefond's style of Corliss valve gear, was under repair in August last. It appears to be liked very well, excepting for the extra care it involves.

Some of the engines are provided with cab seats like those of mowing machines, but the space they occupy in their usual position (shut down against the side of the cab) is begrudged by the unthankful runners.

The company's shops are at Saintes (Southwestern France), but most of the engines appear to have been built at Creusot or by the Société Alsacienne de Belfort. The Western line takes the State Company's traffic from Chartres to Paris, and at the former place the opportunity to compare the machines of the two lines did not reflect credit upon the "Ouest" locomotives.

CHEMIN DE FER DU MIDI.

Fig. 3 shows an express engine of the Chemin de Fer du Midi. This is a small type of engine, with exceptionally large front bearing wheels (56 in.), built by Schneider & Company of the Creusot works. They are equal to 185

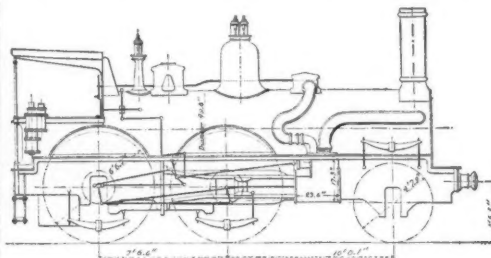


Fig. 3.—Express Engine—Chemin de Fer du Midi.

tons at 47 miles per hour, at 141 lbs. pressure. The fittings are screw reverse gear, screw regulator wheel (a device peculiar to this line), steam cylinder oilers and Wenger compressed air brake.

Principal dimensions:

Cylinders, 17 x 23½ in.
Driving wheels, 78 in.
Heating surface (firebox, 96 sq. ft.), 1,194 sq. ft.
Grate area, 18 sq. ft.
Weight on drivers, 66,000 lbs.
Total weight loaded, 45 tons.
191 tubes, 11 ft. 5 in. long.

Fig. 4 shows a very good type of their usual construction, such as was shown at the Paris Exposition last year.

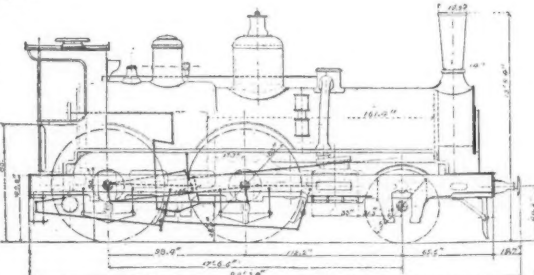


Fig. 4.—Express Engine—Chemin de Fer du Midi.

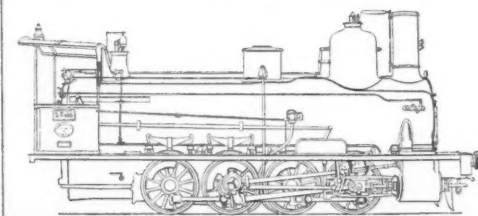


Fig. 5.—Standard Freight—Chemin de Fer du Midi.

The freight engines of this line (see fig. 5) are constructed at Creusot. They are of a type that may be

found on many French lines, with minor differences, and therefore may be regarded as a standard French freight engine for the heaviest service.

Principal dimensions:

Cylinders, 21 in. \times 24 in.
Eight connected wheels; diam., 47 in.
Boiler, 60 in. diam., 16 ft. length, 217 tubes.
Total length over firebox and smoke chest, 26 $\frac{1}{4}$ ft.
Heating surface (firebox 115 sq. ft.), 2,017 sq. ft.
Grate area, 19 sq. ft.
Pressure, 127 lbs.
Total weight loaded, 59 $\frac{1}{2}$ tons.

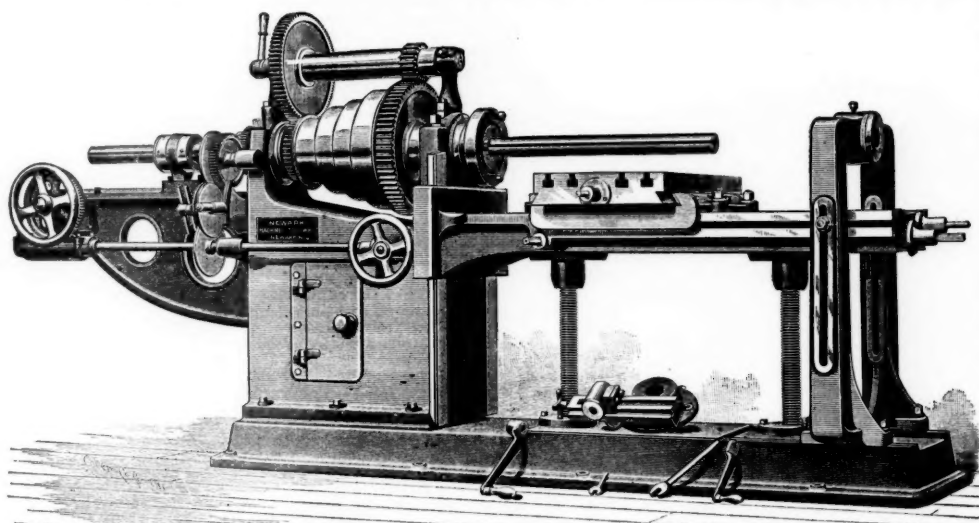
They are equal to train loads of 130 tons at a speed of 12 miles per hour on grades of 1 in 30. A lateral play of $\frac{1}{8}$ in. is allowed to the rear and forward axles by means of inclined faces on the boxes.

(TO BE CONTINUED.)

Large Horizontal Boring and Drilling Machines.

We show an illustration of one of the latest designs of boring and drilling machines built by the Newark Machine Tool Works, Newark, N. J.

This machine has been on the market for some time, although no special attention has, until now, been called to it. The machine illustrated is of the "C" grade or size, and has a 3-in. bar and a 5-ft. table. The swing over the platen is 3 ft. 3 in., and over the table 4 ft. The platen is 30 in. long, 17 in. wide and has a cross motion of 24 in. The measurement of this machine over all is 10 ft. 9 in. in length, 4 ft. in width, and it weighs 7,500



BORING AND DRILLING MACHINE, "C."

Made by the NEWARK MACHINE TOOL WORKS, Newark, N. J.

lbs. It will bore up to 18 in. diameter. Larger machines are built, having boring bars of 4, 5 and 6 in. diameter. The weight of the larger machine being about 17,500 lbs.

As will be noted, the table can be raised or lowered to suit the work of the machine, and such raising and lowering can be effected from the side or end of the machine. The cross platen has the usual movements and the usual devices for effecting them. A special platen is furnished, if called for, which is fitted to be set at any desired angle to the machine.

The position of the feed and operating parts has been changed to match the customary lathe positions, that is, to the left of the operator. The feed details have been simplified as much as possible, while being kept up to an extreme capacity of range and variation.

The Sellers friction disk has been adopted to effect the feed-rate changes. The movement of a connecting lever instantly changes the rate of feed between the limits of one-eighth and one-quarter of an inch. The Sellers friction disks drive a long worm shaft, which, at the rear of the machine, is provided with a pair of right and left worms cut upon a sleeve fitted to the worm shaft. These can be moved to and fro at will to connect with the operating wheel and change the feed to act in either direction. By such means the cutting tool, after passing in one direction, may be run back for a second or finishing cut without touching the bar. The feed-slide clamp grips the bar by friction only, thus enabling it to grip at any point on the bar, instead of having fixed localities and pin-holes.

All the parts of the machines are made sufficiently heavy to fit them for the duty to be performed, and special attention has been paid to the design and construction of the yoke supporting the outer end of the boring bar and the table.

The grading of these machines is by the diameter of the boring bar and of the hole which the machine can bore, instead of by the swing or distance between the centre of bar and the clearance of the table.

The City & South London Subway.

BY AN OCCASIONAL CORRESPONDENT.

As promised you, I have to-day taken the first opportunity of a through trip on the new electric subway. I could scarcely have chosen a worse day. The train was

both ways crowded to excess, one half of its occupants being a crushing, shouting troop of rowdies—a regular Bowery crowd of young ruffians.

The journey down the elevator appears shorter than anticipated. The cage, which occupies one-half of a circular pit about seven yards diameter, is of semi-circular shape, with doors at each end, of the lazy tongs or lattice type, rather heavy and clumsy, and evidently not specially designed for the work. The elevators are supposed to hold 40 people, but there must have been 60 or 80 in the one I descended by. The station below ground is a low arched structure, gas lighted and lined partly with white glazed brick and tiles, but partly whitewashed on the plain brick where the tiling is not yet completed.

The cars were three in number, of the vestibule type, with spacious end platforms about 5 $\frac{1}{2}$ ft. from car end to the car end. At each side are the same lazy tongs doors to the full height of the cars, but again very much too heavy, quite unnecessarily so. They give, however, an unimpeded passage in and out as wide as the end platform is long, and so afford a fairly free ingress and egress and avoid the delay of end doors as seen so markedly on the New York elevated roads.

Each car will seat 20 on a side with fair comfort, or 120 in the whole train, while the middle passage will afford standing room for another 150 or 200 if packed like the elevated trains. The end platforms are not allowed to be occupied. One need not hesitate on the score of room

From the space available I should myself work the line more like the New York elevated roads, with tickets and a box to cast them in. The present system is positively dangerous from the risk of injury against the turnstiles, which are being forced beyond all legitimate use. With these defects remedied the line will surely be popular.

As regards the running, we did as well as if hitched on to a 20-ton steam locomotive; no hitch either way. I can only wonder that there has been so much secrecy observed and so little opportunity afforded the press of knowing how the affair was progressing.

Soon after leaving the King William street terminus one can feel the sinuous nature of the southbound tunnel as it winds above the other tube and again ranges itself alongside. This is done on account of a narrow street, or other bounds within which the two tubes had to come. I conclude the return or north tube is straight, as no such motion could be observed.

With the exception of the bad entrance and the long headway of the trains there was little to complain of. The motor I could not see much of. It seemed neatly and compactly arranged, and its driver looked as like an ordinary driver as he well could do—simply handling a lever and the brake, which latter is very powerful.

No waiting rooms are provided or any shelter for those waiting for the gate to open. We stood out on the sidewalk, obstructing lawful traffic and jeered at by the bus drivers as rats and sewage; the sewer and the rat holes being their name for the new rival, which, however, either worked like this, by electricity, or by compressed air, will extend to an enormous degree. It is likely, however, that better provision must be made for ventilation. Undoubtedly, to-day the air was much vitiated, and probably it does not become changed at the shafts and staircases, but is merely churned to and fro in the tubes by the trains, and so is gradually accumulating carbonic acid from passengers, burning gas lamps and tobacco. I am not alone in this opinion, and so mention it.

LONDON, Dec. 26, 1890.

The following description of the passenger hoists designed and constructed by Messrs. Sir William Armstrong, Mitchell & Co. is reprinted from *Engineering* of Dec. 26, 1890:

The hoists by which communication is effected between the underground railway platforms and the street level are on the high-pressure hydraulic system. At each of the six stations there are two of these hoists working in a vertical shaft about 25 ft. in diameter, and of a depth varying from 43 ft. at Stockwell to 67 ft. at King William street. The cages are of semicircular form and occupy the whole area of the shaft, excepting such space as is required for the machinery and for the guides and counterbalance weights. They are framed in steel and are plainly but handsomely fitted up inside with polished mahogany and pitch pine, the inside dimensions being approximately as follows: Length, 22 ft.; width, 9 ft.; height, 11 ft.

The two hoists in each shaft are entirely independent of one another, each having its own lifting machinery, and this machinery is fixed vertically against the sides of the shaft. The multiplying power of the cylinders is 3 to 1, and each cradle is lifted and lowered by six steel wire ropes, passing over large conveyance sheaves carried by girders at the top of the shaft. Four of these ropes are in connection with the hydraulic cylinder and two with the counterbalance weights, and their united strength for each cradle amounts to over 320 tons. The cradles are also fitted with safety apparatus in connection with each of the guides, of which there are four to each cradle.

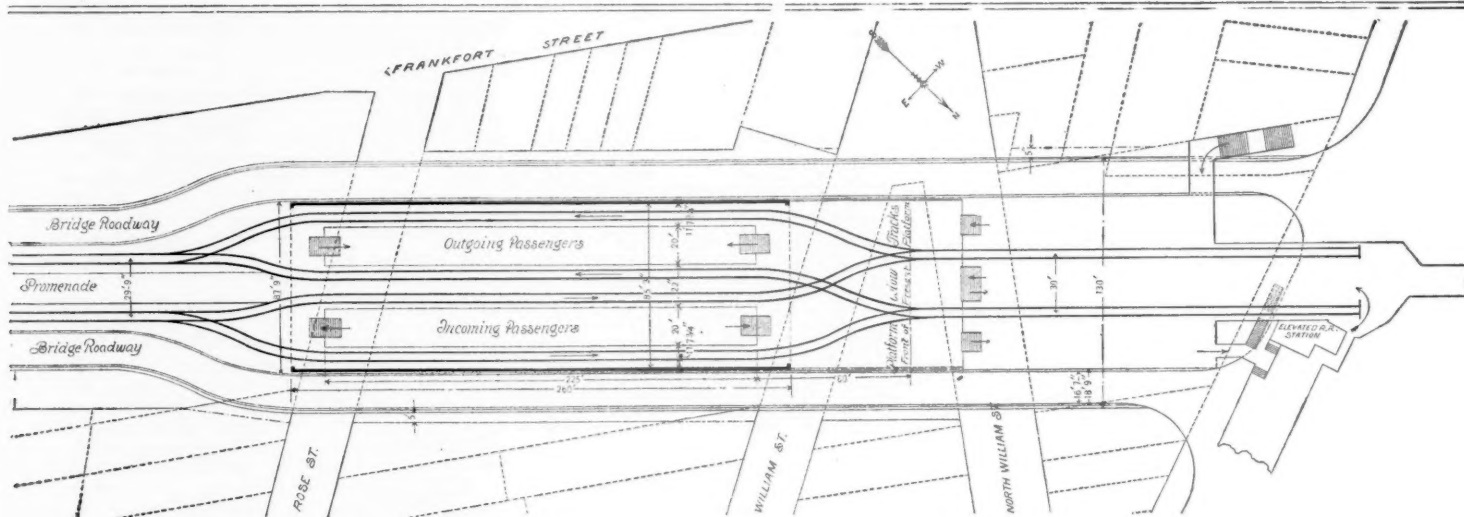
Notwithstanding the fact that the distance between the terminal stations amounts to over three miles, the hoists at all the six stations are worked by pumping engines erected at the Stockwell depot, the water being conveyed under a pressure of about 70 atmospheres through pipes, which are of such ample size that the loss of power, owing to the friction of the water, is quite inconsiderable. These pipes, as well as those by which the exhaust water is returned to the tank at Stockwell, are laid in the subway, and the water under pressure is used also for clearing the tunnel of such water as may accumulate in it from leakage or condensation. This is effected by a modification of Greathead and Martindale's injector fire hydrant. In order to equalize the flow of water through the pipes, an accumulator is provided at the Elephant and Castle Station, in addition to that at the pumping station at Stockwell, and with the same object the exhaust water is discharged into a large air vessel at each station, instead of directly into the return water pipe. The pumping engines at Stockwell are of the horizontal compound non-condensing type, working with a steam pressure of 90 lbs. per square inch, and each capable of developing 140 horse power. The high and low pressure cylinders are 15 $\frac{1}{2}$ in. and 20 $\frac{1}{2}$ in. in diameter, respectively, the stroke in each case being 20 in. There are three pairs of these engines arranged so that each can be worked either alone or conjointly with the others. They are entirely automatic in their action, being so constructed that when the accumulator is fully charged it stops the engines, which start again of their own accord as soon as the accumulator begins to descend, owing to the working of the hoists.

A Lesson Taught by a Wreck.

Herewith are given cuts showing how a wreck was recently caused by a broken brake beam hanger—a simple minor attachment—which resulted in a considerable delay to traffic and cost to the railroad company over whose line the foreign brake beam hanger which caused the wreck was passing. The responsibility for this accident would ordinarily be placed with the car inspector who received the car, but it more properly belongs to the owner of the cars who permits brake beams to be hung without safety chains or straps.

The facts were these: Train No. 85, on the Chicago, St. Louis & Pittsburgh, was wrecked near New Westville, Ohio, on Nov. 13 last by the dropping of a brake beam

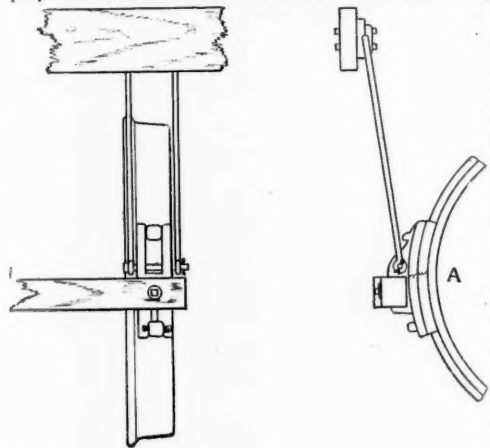
The system of payment and no ticket will not do,



PROPOSED PLAN FOR THE NEW YORK TERMINUS, NEW YORK & BROOKLYN BRIDGE.

Reproduced from the RAILROAD GAZETTE of Dec. 27, 1889.

on the car immediately behind the tender. From the evidence it would appear that one end dropped first. The cut shows how the brake beam was hung without safety chains. As near as can now be determined, a brake beam of the kind, and with the hangers shown, fell from the first car because of the decayed timbers of the car and derailed the front truck of the second car, and after that derailed the rear truck. Both of these trucks dropped back against the trucks of the third car and derailed them. Both trucks of the second car left the track and went down the embankment on the south side, a short distance from the point where the wheel marks on the ties commenced,



which probably was the point where the trucks were derailed. The wheel marks on the ties continued after the trucks of the second car went down the embankment, thus showing that the trucks of the third car were derailed at the time the trucks of the second car went down the embankment. The train ran quite a distance with no trucks under the second car, the body of that car being supported only by the couplings, which were of the link-and-pin type.

When the engineer discovered there had been an accident he broke away from the train, taking with him the first car with the body of the second dragging along on the track until the coupling broke and this car rolled down the embankment on the north side of the track, about 1,400 ft. from the point where the accident occurred. The third car then left the track or was pushed from it by the car behind, as it was found at the foot of the south side of the embankment. The broken brake shoe, broken at A, and fragments of the brake beam were found at the initial point of derailment.

The Expert Report on the Brooklyn Bridge.

The Board of Experts, to which was referred in May last the problem of terminals for Brooklyn Bridge has made a report to the Committee on Terminal Facilities of the Bridge Trustees. Messrs. Samuel Spencer, George W. Plympton and C. W. Buchholz constitute the Board. After rehearsing the action of the Trustees in the matter, and the Board's call for suggestions and proposals, the report is substantially as follows:

The railroad traffic for the last year amounted to 37,667,411 passengers, or an average of over 100,000 per day for the entire year. The maximum number in one day was 181,405. Taking one day for each year to show approximately how the maximum number one way in one hour has increased, we have the following:

Year.	Maximum passengers per hour, one way.
1883.....	1,560
1884.....	4,620
1885.....	4,625
1886.....	7,870
1887.....	10,068
1888.....	11,413
1889.....	13,355
1890.....	13,667

The present capacity of the bridge trains one way is about 18,000 passengers per hour, or 40 trains of four cars each with one minute and 30 seconds headway and

100 passengers per car. To increase this capacity it is necessary either to reduce the headway or to increase the number of cars per train. The Board reached the unanimous conclusion that relief must be sought rather in the increase in number of trains, that is by the reduction of the headway, than in the number of cars per train. When regularity and promptness are required—and on the bridge they are essential to success—shortness and lightness of train are important elements. It is doubtful whether it will ever be desirable to run trains of more than 5 cars each upon the bridge, and for the present it is believed that the best results can be obtained with four.

The loop system, particularly for the New York terminus, possess many attractive features, such as the reduction of the number of switches, dispensing with locomotives and with switching tracks over the street, loading trains in the same position in which they are unloaded, and keeping the current of car movement always in one direction without switching.

Some plans provide for a single loop line, with incoming platform on the exterior and the outgoing platform on the interior of the curve. The advantage of this, so far as relates to handling the passengers, would be that the incoming and outgoing passengers would move out of and into the cars without conflict, but it is evident that this would not save sufficient time to secure the required increased capacity over the present single-platform system without greatly lengthening the train; and the only elasticity in such a system to meet the hourly fluctuations and the constant growth of traffic would be in the number of cars per train. This, in the judgment of the Board, would not give satisfactory results in practice.

Other loop systems contemplate two or more platforms, with tracks between, these tracks converging to the main line as rapidly as possible on each side. This plan would meet fully the requirements as to unloading and loading trains in sufficiently quick succession, and it also admits of the location of platforms near the entrance at Park Row, New York, thus saving a long walk for passengers.

No device has been submitted to the Board, however, for the operation of cable trains around such a loop, which has been sufficiently developed in practice to warrant its adoption now.

To locate the platforms on straight lines, parallel with Park row, and complete the loops, involves the purchase of such large amounts of expensive real estate as in the judgment of the Board to be prohibitory, and to locate a sufficient number of platforms on curves of such short radius as to reduce the cost for real estate to within moderate limits, seems entirely impracticable.

The head house system, so called, would have many advantages for the New York terminus in bringing the platforms nearer to Park row, facilitating connection with the elevated railroad and with the street, and in avoiding the projection of switching tracks beyond the building line of the terminal station on Park row; but the delays—to say nothing of the possible dangers—in switching loaded trains in the face of each other and over the necessary crossings, forbids its serious consideration where trains are moved by cable power, approaching the station on a descending grade of over three per cent., and at the very short intervals required between trains to move the heavy traffic of the bridge.

This leaves but one system of terminal handling—substantially the one now in use—to be considered. Despite the many adverse criticisms which have been made upon it, its defects have been, not in the principles employed, but in the want of adequate additions to meet new requirements. The system is not wrong, either for safety or expeditious movement, but it has not been developed as the traffic grew. It is the only one which experience has justified in the operation of the bridge railroad, and this experience is, in many particulars, of governing importance in forming conclusions as to what is best for the future.

This railroad is the only one which has successfully operated a cable line upon heavy grades with trains of four cars, and of more than 80 tons in weight, and it is probably carrying safely more passengers per day and per hour at certain periods of the day, between two given points than any other transportation line in the world. The apparatus for accomplishing these results has been of gradual development, and while confessedly not perfect, has had remarkably few failures.

The plant should be so enlarged, and parts duplicated as not to be overtaxed by more than double the present traffic. With the overstrain removed and emergencies better provided for, the chief objections to the system will disappear. The enlargement to be successful must be upon the lines of experience. The volume of travel is of a size and a character which admits of no serious interruption. No experiments can be tried with the machinery which hauls it, and no plan of improvement is permissible which endangers its continuity.

Looking at all these facts the Board unanimously recommends:

1. That the terminals be enlarged, both in New York and Brooklyn, substantially as shown in the accompany-

ing plan, the incoming and outgoing platforms to be not less twenty (20) feet in width and 225 feet in length, with a track on either side of each.

2. That two gauntleted tracks be laid on each line of railroad, the one leading to the north side and the other to the south side of the incoming and the outgoing platforms respectively, thus avoiding the regular use of switches by loaded trains, and reducing to the minimum the possibility of derailment from broken tracks.

3. That two cables be used—one for each tract of the gauntlet—both to be run regularly during the busy hours of the day, and the second one when not in use, to be kept ready for immediate service in case of accident or other emergency. These two cables should be operated by entirely separate machinery, so that the efficiency of one is in no way dependent upon any part of the apparatus connected with the other.

4. That as soon as possible the grip apparatus be so arranged that the cable can be dropped and picked up at any point on the line.

The Board recommends that the Brooklyn station be located between High and Sands streets, adjacent to and parallel with Washington street, and that sufficient property be acquired for yard and storage purposes in extension of the present yard up to Tillary street. This location is suggested because it accommodates with least change all the transportation lines which bring traffic to the Bridge; it requires less outlay for real estate than any other convenient and suitable one, and it accomplishes the object with least possibility of conflict and delay.

Continuing, the report says that the Board believes that these plans, if adopted, will meet all the substantial requirements of the case, at the minimum outlay for property consistent with the objects in view, removing at the same time, so far as is now practicable, the delays and annoyances to the public, and the loss of revenue to the bridge, incident to the present limited facilities.

The headway between trains can be reduced to 45 seconds, increasing the capacity of the railroad with 4-car trains from 16,000 to 32,000 passengers per hour, or with 5-car trains to 40,000. If, as is probable, the headway can be made 40 seconds, the capacity for 4-car trains will be 36,000 and for 5-car trains 45,000 per hour. Before this limit is reached the growth and distribution of the population in the two cities will be such as to demand other means than this one bridge for quick transit between them, and the problem will likely have assumed such different phases that no calculations upon it now would be of much value.

Parties have appeared before the Board with plans for transferring the empty trains from the incoming to the outgoing platforms by means of circles of very short radius, to be located at the west end of the platforms, and offering, at their own expense, to make the necessary demonstration, on a large scale, of their practicability. It is suggested that the bridge Trustees, by such method as seems best to them—either by the offer of premiums to others, or by experiments conducted on their behalf by the officers of the bridge—endeavor to secure the use of suitable appliances for this purpose, and that the New York terminus be planned with a view to the possible adoption of a system of circles instead of the switching tracks, all within a building to be erected on the land now owned or to be acquired under the suggestions here made. If such a system can be adopted, it will be possible to move the platforms nearer to Park row, which is very desirable; and if, by that time, it is found expedient to use three platforms to still further reduce the headway of trains, the track floor of the building can be made to project over the roadways for a part of its length, and width be thus obtained for the third one.

Until the tail switching into the street can be eliminated it is not believed that any desirable or suitable building can be erected at the bridge terminus on Park row from which rentals can be obtained; but such a building, with the locomotives dispensed with, could and should be made not only a handsome and fitting portal to the bridge, but also a source of revenue from expensive real estate necessary for the purposes of the bridge, but otherwise unproductive.

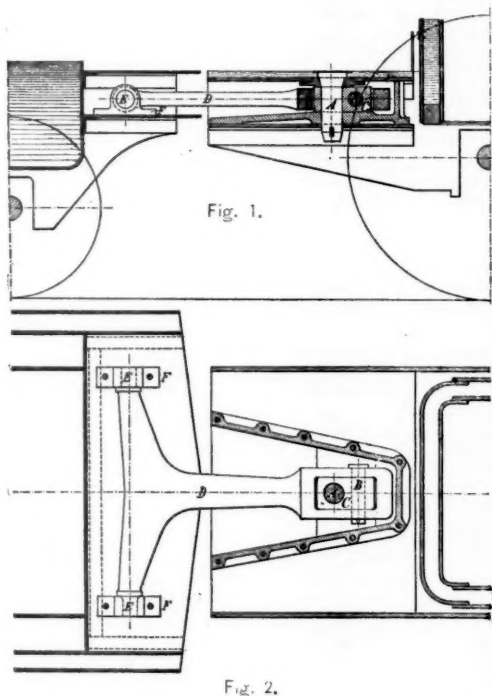
A German Coupling Between Locomotive and Tender.

The Württemberg State Railroads are running new compound express locomotives, which are proving more efficient and are running smoother than their other types. The even running is in part due to the new coupling between the locomotive and tender. This connection is illustrated in the *Organ für die Fortschritte des Eisenbahnwesens*.

The spacing of the wheels of the compound is the same as that of the older locomotives. The rear coupled axle lies under the fire box. The smoother running with the new coupling prevents a great deal of wear of the rails,

An important decrease is also noticed in the wear on the tender wheel flanges.

The new coupling, figs. 1 and 2, is very strong; the coupler bolt is 3.9 in. in diameter. All sliding parts are fitted so closely that locomotive and tender must move alike laterally, and the united weight of both tends to moderate the lateral motion. The freedom of the spring motion is not injured by the coupling as the coupler *D* on the tender is hinged in two horizontal trunnions *E*, and on the locomotive in one horizontal trunnion *B*. On the tender the coupling rests in two



bearings *F*, which are screwed upon the stiffening plate under the platform; on the locomotive it rests in sliding piece *C*, which is attached above and below to the foot plate and turns freely on the coupler bolt *A*. The slide piece *C* is fitted into a slot in the end of the drawbar *D* and is thicker than the end of the bar, as shown. The foot plate is of cast iron covering sheets, and is joined with both the rear frame stiffening plates by bolts. The entire sliding surfaces are made so large that after a year's service no perceptible wear is shown.

The distance of the coupler bearings from the axle centres is so taken that the middies of all four end axles lie at all times in the same arc; thus, the locomotive and tender pass over all rail irregularities with ease, even if the track is not perfectly laid. The change to compound locomotives makes a boiler pressure from 170 to 220 lbs. desirable. The stronger boilers give a greater burden on the rear axle of the locomotive, hence a reduction of the overhanging weight is desirable. The new coupler makes it possible to shorten the locomotive frame and to replace the cast-iron coupler by wrought iron, whereby the weight is considerably diminished.

The New Western Agreement.

The meeting of the Advisory Board of the roads west of Chicago, each road being represented by its president and one director, was held in New York on Jan. 8 and following days, as announced. The first business was the appointment of a committee consisting of the presidents of all the roads to report a code of by-laws. This code, which will be found on the last page of this paper, was reported by the committee on Saturday, and adopted by the Advisory Board. Besides the roads named in the preamble to the by-laws, the meeting was attended by President H. K. Enos, of the Missouri, Kansas & Texas, which road is, however, in a receiver's hands. The name of the new organization is the Western Traffic Association, and Roswell Miller, of the Chicago, Milwaukee & St. Paul, was on Saturday chosen President of it.

On Monday Mr. Walker was chosen Chairman of the Board of Commissioners and Messrs. J. W. Midgley, J. N. Faithorn, W. W. Finley, James Smith and E. P. Vining were chosen to fill out the board. A resolution was then adopted dividing the territory of the association into five districts as follows: Transcontinental, Southwestern, Western Passenger, Western Freight and Trans-Missouri. These are the present divisions, and it is understood that the Commissioners will be assigned as follows: Mr. Midgley to retain the Western Freight Division, as at present under the old organization; Mr. Finley to retain the Western Passenger Division, Mr. Faithorn to retain the Southwestern Railway and Steamship Division, Mr. Vining to take the Transcontinental Division and Mr. Smith to go to the Trans-Missouri Division. Mr. Smith has been Commissioner of the Transcontinental Association, and Mr. Vining was for a long time General Freight Agent of the Union Pacific and afterward Chairman of the Western Freight Association. The

Commissioners now in office will retain their present headquarters, and, with the chairman, will meet in Chicago when necessary. The Advisory Board then adjourned to meet at Chicago in April, but a special meeting may be held before that time to consider the question of joint agencies, which, with all other important questions, was left undecided.

Legislation and the Western Presidents' Agreement.

There is a fear in the minds of some that any action looking toward higher rates taken by the Advisory Board would be followed by hostile legislation on the part of important Western states. . . . This fear is no doubt owing largely to the Farmers' Alliances. Just what effect these alliances will have upon the railroad problem is as yet as hard to determine as their political outcome. West of the Missouri River the farmers' organizations are demanding many hard laws against the railroads. In Kansas they propose a law requiring the Railroad Commissioners to be elected by the people, because the present Commissioners have presumed to have ideas of their own about fairness as between carriers and shippers; also such a reduction of tariffs as will yield an annual income not exceeding 6 per cent. upon the investment, meaning, presumably, first cost.

In Nebraska the biennial report of the Attorney-General to the Governor is full of denunciation of railroads for issuing stock without consideration upon which dividends are paid through extortionate charges. The political game which has been played for some little time by the politicians in and out of office in Nebraska is now so well understood that these fulminations are not taken seriously. It so happens that the Board of Transportation of that same state investigated the subject of cost and charges of railroads last July and reported that no reason existed for reducing rates generally. The Chicago, Burlington & Quincy, having 2,203 miles within the state, was carefully investigated with the declared result that the annual earnings of that road in Nebraska were found to yield just 5.09 per cent. upon original cost and subsequent betterments. With such a report before it there seems little probability of large reductions on the part of the Nebraska Legislature.

East of the Mississippi the feeling is conservative. The Illinois Board has nothing to say about reduction of charges. Its attention has been largely taken up with questions of safety appliances, and in this respect—the need of better apparatus and of earnings to pay for them—it no doubt represents the opinions of a majority of the people. . . . The cost of interlocking plants, automatic couplers and air brakes for freight cars would be a sum larger than the annual dividends paid by all the Illinois roads, and nearly half the total bonded interest. Such facts should, and doubtless will, make the Illinois Board conservative in advocating improvements or in calling for lower charges. Praise is due to the Minnesota Commissioners, who put forth a moderate platform in their report, whether led thereto by the adverse decision of the United States Supreme Court upon their arbitrary action last year or not it is needless to inquire. The Board states its principles in the order of their importance, thus: 1. Transportation of persons and property without discrimination as to persons or places. 2. Safe conveyance of the same. 3. The best service the system is capable of; and 4, the cheapest transportation that is compatible with the foregoing, and is just to the companies doing the service. Here the propositions are put in their true relation; not abnormally low rates and safe conveyance with good service, but efficiency first and the necessary earnings afterward. If government regulation is to stand the test of close examination and be justified before the common sense of the people, it must be based upon a clear conception of the relations between expenses and earnings. Compulsory increase of the one and compulsory reduction of the other, without responsibility on the part of the government for the results, could not long win the consent of the American people.

There is, therefore, much in the general situation at the West to encourage railroad managers. It is hardly correct to suppose that hostility to the "Trust" (as the agreement of railroads has been called) will culminate in severe laws against the carriers, if the Advisory Board is moderate and attempts only to secure for the roads rates not much, if any, higher than those now nominally in force, and against which there is little or no complaint. —New York Evening Post.

Train Accidents in Great Britain.

The half-yearly return of the British Board of Trade to June 30 last shows six passengers and eight employes killed, and 120 passengers and 58 employes injured, by train accidents. The number of train accidents specially investigated was eight, and we give below condensed accounts of these reports.

At Burnhouse Weighs, on the Caledonian road, June 3, a car in an express freight train was derailed at a facing-point switch. The track at that point is perfectly straight and level; there was no discoverable defect in the track or rolling stock, and the inspector, General Hutchinson, is forced to the conclusion that the signalman threw the switch under the train. There are marks on the switch rails and sleepers tending to support this view. But to do this the man must have thrown the home signal to danger immediately after the engine of the train had passed it, and then must have unlocked the facing-point before the engine reached the detector bar. It appears that the bar is 420 ft. beyond the signal, and it is estimated that the train must have passed over this distance in 10 seconds. The signalman, who had seen 10 years' service, acknowledged that he threw up the home signal sooner than the rule allows, but strongly denies having moved the locking bar lever until after the train had passed the switch. The only recommendation of the inspector is, that "the premature action of signalmen in throwing signals to danger is very common, and inspectors should take special pains to enforce the rule forbidding it."

On May 22, between Loch Earnhead and Glenoglehead, on the Callander & Oban Railway, a six-wheeled carriage in a passenger train jumped the

track on a curve of 1,089 ft. radius and ran 700 ft. on the ground, when the train was stopped by the application of the continuous brake by an officer of the road in the rear car. No cause can be discovered for this derailment, but General Hutchinson thinks it is "fair to conclude that something was out of order in the carriage. . . . The journals of the middle axle may not have moved over to the right but have become jammed; possibly the slight want of accuracy in the gauge may have caused the accident instead of being caused by it." The train was running only 20 miles an hour.

A rear collision occurred on the Great Northern at Retford, June 6, at 11:43 p. m., between an express fish train and a passenger train which had just started from the station. The fish train was held outside the station some minutes, but, in accordance with the usual custom, it was allowed to pass from the north to the south end of the yard through the station (following the passenger train) on a permissive signal from the block operator. This operator did not strictly observe the rules, but it appears that the engineer of the fish train did not look carefully for the tail lights of the passenger train, which were burning brightly. All the rules and conditions required him to run under control, but he kept his eye on the home signal at the south end of the station, and, when that was lowered for the passenger train, put on steam as though it had been lowered for him. Major Marindin says that absolute block working for passenger trains cannot be observed in this station yard, and that the rules for permissive blocking are satisfactory, but he recommends that freight trains be not allowed the privileges of this rule.

At Aberdeen, on the Great North of Scotland, June 5, a passenger train ran into the rear of a freight train, in consequence of the failure of the block working between Kittybrewster and Aberdeen. The signalman at the former place admitted a train to the section without notifying Aberdeen. The latter, therefore, did not lower his signals and the train stopped at the distant signal and waited about four minutes. While this train was running from the one station to the other another train came to Kittybrewster, and the block instrument still standing clear, owing to the previous train not having been signaled forward on the wire, this second train was allowed to proceed. Aberdeen, not having been advised of the first train, now lowered his distant signal, at which the first train was waiting. The foremost train then pulled forward, but stopped again before reaching the home signal, so as to leave some cars, and when so stopped was overtaken and run into by the second train. The engineer of the second train is acquitted from all blame, the road lying through a tunnel, so that steam and smoke obscured his view. It appears from this collision that distant signals are used as absolute stop signals upon the Great North of Scotland (as well as on other roads). If the first train had been allowed to pull up to the home signal, the Aberdeen signalman would have discovered the mistake which had been made and could have averted the collision. The place where the train actually did wait was out of sight and hearing of the Aberdeen cabin. Major Marindin recommends the company to "consider the advisability of altering the regulations." But it appears that the home signals at this and other yards are not located so as to cover all of the sidings and switches, and in order to make consistent rules the company will have to change some signals. This, indeed, is required under the law of 1889, requiring the absolute block signal system on all passenger railroads. Major Marindin also criticises the system of block working, which is negative instead of positive; that is, the operator always assumes the line to be clear, if the electric signal so indicates, even if the last train has been gone a long time. The proper method is to ask permission for every train at the time it is desired to send it forward.

On the London & Northwestern, at Earlestown, on the night of June 20, a pushing engine, after leaving its train at the top of a grade, ran back down on the same track it came upon, instead of going through a crossover track and down on the other main line. It met a train coming up, and the engineer of the pusher was killed. The road is perfectly straight, the block section is only two-thirds of a mile long and both engines had proper lights. The signalman who allowed the pusher to go back without throwing the crossover switch has been in service 35 years. There were three men on the engine, not one of whom observed that they proceeded along the main line instead of through a crossover switch; they also failed to note their error when they passed some cars on a siding, and went under an overhead bridge. The vital mechanical defect was that the crossover track had no "back-up" signals, the signalman giving the runner leave to move by verbal notice. Colonel Rich, the inspector, recommends that "signals be provided for all such crossover tracks used constantly by bank engines," but says nothing about the desirableness of such signals at all crossovers.

On April 20, at Raynes Park, on the London & Southwestern, the engine of a passenger train which had to do some unusual switching, in consequence of an obstruction upon its regular track, was derailed at a switch, in consequence, apparently, of the signalman signaling him by hand to go through a switch which had not been properly set. This occurred about 12:30 a. m., and was within 60 ft. of the signal box. But half an hour later the signalman who had made this

loses 26.30 marks, or 39 per cent., of which the shipper gets 9.55 marks, or one-third, while the forwarder obtains the other two-thirds.

These, it is to be remembered, are the *minimum* regular rates, and the forwarder will doubtless charge more when he can. On the other hand, the Rate Committee of the Berlin syndicate is authorized to make lower rates, where the interests of the forwarders would be served thereby, as on certain routes where competition may be feared and for shipments of large quantities. Thus it is impossible to say for the whole of the traffic exactly what part of the saving made by collecting small shipments into car loads goes to the public and what to the forwarder. Mr. Monge gives a table of the actual forwarders' rates from Berlin to 29 different places, and by the side of them the car-load and less than car-load rates of the railroads, from which it appears that in one case the forwarder gets seven-eighths of the saving, and in another only one-fifth of it; but in most cases from one-half to two-thirds. One of these places is Vienna, which is outside of territory to which the German railroad tariff applies; but the forwarders get a rate thither which is more than 44 per cent. lower than the rate for small shipments.

In most places it is rarely possible for the forwarders to secure enough freight of one kind to make a car load which will enable them to secure the *special* rates of the railroads which are considerably lower than the rate applying to a car load of goods of various kinds. These special rates are secured chiefly by great manufacturers, miners and dealers in coarse goods, etc., but at certain places where manufacturers of hardware, etc., have frequent occasion to make comparatively small shipments to many different dealers or other purchasers the forwarders are able to collect car loads for which the railroads admit the special rates. In such cases they usually give the shippers part of the difference between the general car-load rate and the special car-load rate. Monge illustrates this by citing the following *forwarders' rates* from Aix-la-Chapelle, both by the general car-load rate (for mixed freights) and by the special rate—in marks per ton of 2,200 lbs.:

Aix-la-Chapelle to:	Ordinary goods.	Special rate goods.	Difference.	P. c.
Berlin.....	62.50	50.00	12.50	20
Breslau.....	92.00	80.00	12.00	14
Dresden.....	78.00	68.00	10.00	13
Leipzig.....	60.00	50.00	10.00	17
Stettin.....	83.00	66.00	17.00	20

It seems from this that the forwarders give but one special rate, while the railroad tariffs provide three, and the forwarder's profit by the application of the highest of these amounts to 16 per cent., of the second to 25 per cent., and of the lowest to no less than 40 per cent. In most places the forwarders do not offer any special rate, however; and if one happens to be fortunate enough to collect freight which entitles him to one, he then gets the full benefit of it, in which case he secures from three-fourths to four-fifths of the great difference between the railroad rate for less than carloads and the special car-load rate.

The highest of what we have called car-load rates is really a half car-load rate, the minimum quantity required to secure the rate being only five tons—11,000 lbs. In some cases a shipper who has that quantity to ship may take it to a forwarder in hopes of securing part of the difference between the 5-ton and the 10-ton rate; but the difference in the rates for these two classes is not great enough to enable either shipper or forwarder to make much out of this arrangement. On a shipment for 100 kilometres (62 miles), for instance, the 10-ton rate is but 29 cents per ton lower than that for a 5-ton shipment. In Berlin, however, the forwarders on the average dispatch weekly 10 full car loads formed of such 5-ton shipments. They do not make much out of this, but it comes in the way of their business, and doubtless is a convenience to many of their customers who give them a great deal of much more profitable business.

The forwarders also in many cases cart the freight to and from the stations. In Berlin they seem to have such control of the cartage as to be able to establish a regular tariff for it, which is at the rate of five marks per 1,000 kilograms—\$1.00 per ton of 2,000 lbs.—charging for fractional amounts six cents for every 110 lbs. or smaller amounts. If rates are offered by the forwarders to the public, including cartage, this charge of five marks per ton must be added. Now five marks per ton is twice as much as the railroads charge for cartage, and the forwarder's profit on this service, which he often makes a condition of his other services, gives him a large part of his income. In certain cases, however, these cartage rates are reduced one-fifth.

The German railroads limit their liability for freight lost or destroyed to 1.50 marks per kilogram—16½ cents per pound—and charge for insuring to this amount one-tenth of one per cent. of the value assigned to the goods by the shipper. The Berlin forwarders require a minimum insurance premium of one-sixth of one per cent. for distances of 300 kilometres or less, and for greater distances one-third of one per cent., though this latter rate is rarely applied. On the average, the forwarder's insurance charge is about one-fourth of one per cent. The forwarders justified their higher charges by the increased dangers of goods consigned to them, which must be in their hands, and perhaps stored on their premises several days, before they can be delivered to the railroads, which only then become responsible.

For all other subsidiary charges, such as for weighing,

use of cranes, etc., the forwarders must charge, according to the rules of their association, at least as much as the railroads charge. One of their regulations expressly requires that no service be rendered without charge, and that no rebate or drawback may be paid to the shipper.

While it is evident that the forwarders secure by far the larger part of the saving made by uniting small shipments into car loads, in the freights paid to the railroads, yet the advantage to the shippers is so great the German business men are not hostile to their industry; and while the public is apt to be severe in its judgments of the railroad management, it is rather indulgent toward the forwarders, who come between it and the railroads, and secure for it a considerable reduction from the high freight rates for small shipments, which, though they may form but a small part of the total freight shipments, are paid directly by a very large number of people, and so affect public opinion more than some much more important rates, with which the general public does not deal directly. The one objection ordinarily made by the public is to the delay caused by holding small consignments in order to make car loads. "Yet," says Monge, "it must be acknowledged that in this respect the forwarder's service leaves little room for improvement. On the great through lines the transportation is effected with a speed which scarcely eaves anything to be desired." His German translator, however, permits himself to observe that in this respect Mr. Monge seems to be imperfectly informed. Cases are known to the translator in which freight shipped from New York to Berlin was much less time in reaching Bremen than getting from Bremen to Berlin (234 miles) with the assistance of a forwarding agent.

The railroad managers take very various views of the forwarders' industry. Some of them regard chiefly the smaller receipts of their railroads, caused by changing high-rate into low-rate shipments; while others take more account of the services which the forwarders render by simplifying the billing and other station services and utilizing the cars better.

One effect of the system which Monge notes is that it practically gives the large towns, where the shipments are great enough to support a forwarder to do this collecting business, a material advantage in rates over smaller places. He also points out that it causes the railroads' reports of average rates received to be materially less than the rates actually paid by the public.

The German traffic statistics of 1880 report the total amount of freight which was collected into car loads in this way to have been 890,025 kilogrammic tons, which was about one-eighth of the total package freight and $\frac{1}{10}$ of the total freight shipped in the year; and nearly one-tenth of these collected car loads were shipped from Berlin alone. Now the railroads received an average of 2.18 cents per ton (2,000 lbs.) per mile for this freight, which, but for the intervention of the forwarders, must have paid an average of 4.20 cents per ton per mile; or for the average distance of 130 kilometres, which this freight was carried, the roads got \$1.19 less for every ton carried, and for the whole amount shipped in this way, \$1,591,320 less. Monge estimates that of this sum the owners of the freight secured on the average five-twelfths, or \$683,050, and that the other \$908,270 went to the forwarders. The latter, of course, had their expenses, but on the other hand they had other sources of profit, as cartage, etc. The total difference between the freights paid by the public to the forwarders and those received and reported by the German railroads in this year when divided over the whole ton mileage of the year would increase the average rate actually paid per ton per mile by just about 0.007 cent, which, however, we should remember is but about half of one per cent. of the rate reported by the railroads.

While the above is chiefly a statement of the facts as reported by Monge, the writer has permitted himself to make an observation now and then; and he now adds that the most striking thing in this whole industry is that what the forwarders do by a special organization and a close combination, the railroads apparently would be able to do, if permitted, without any such efforts. If all the freight was delivered directly to their agents they would know without consulting any one else how much freight, and how much of each kind, was consigned every day to each place, and would be enabled to combine it in car loads so as to be transported at the least possible expense to the railroads. To argue that the station officials could not do this at least as well as a number of forwarding agents seems equivalent to charging the railroad employees with a lack of common sense and discretion, the fact being that in this particular the tariff fixed by law does not permit them to exercise discretion in this matter. In fact, to a looker-on in Venice (or Chicago), the simple fact of the existence of this business of collecting small shipments into large ones is of itself proof that the rates for less than car loads are unreasonably high, or at least greatly out of proportion to the car load rates. Nevertheless, it behooves a foreigner to be very cautious in forming opinions on the transportation policy of another country, which is likely to be adapted to its wants, habits or prejudices in particulars which escape him entirely, and could not easily be changed, even for the better. An American, especially, should see that in our express companies we have organizations whose work in many respects resembles the collecting and forwarding business of the German "Speditours," though the express companies are not favored

with such an enormous difference between the rates for shipment in freight trains of less than 11,000 lbs. and those for larger amounts.

It may be observed also that though the saving by the intervention of the forwarders is so considerable, after all the total amount of business done through them is, for a nation of 48,000,000, inconsiderable, and even in Berlin, where it is greatest, it is no greater than a small month's shipments out of New York over the trunk lines, and less than two weeks' shipments by rail from Chicago to the East. If they could serve the little places to the same extent as they do the large ones, doubtless, however, they would handle a very much larger proportion of the freight which now is carried at less than car load rates.

European Railroad Notes.

The Paris, Lyons & Mediterranean Railroad requires persons who wish to see their friends off on a train, or enter the waiting rooms for any purpose, to buy a station ticket, the price of which is two cents, and which is good for an hour, if the holder wishes to stay so long; but the ticket must be given up on leaving the station, however short the stay, and to enter again another ticket is necessary.

The Russian railroad which connects the Black Sea with the Caspian, and which forms a direct route from the Russian petroleum field to waters accessible to the shipping of the world, had one serious obstacle in a steep grade at the Suram Pass, where two great Fairlie locomotives could haul only 13 loaded freight cars up the grade. To remove this, a loop line 14 miles long has been built, which includes a tunnel $2\frac{1}{2}$ miles long, which is wider than any other great tunnel, namely, 28 ft. wide, and is also 23 ft. high. One track has been laid through this tunnel, and over this a single Fairlie locomotive is able to haul a train of 20 loaded cars. Work began on this tunnel June 6, 1887, at the west end and Jan. 15, 1888, at the east end, and the opening through was made Nov. 12, 1888. Extraordinary obstacles had to be overcome in the way of fire damp and enormous veins of water, and it was only after something like an interior lake had been drained away that the work could go on.

The quantities of petroleum transported over this road from Baku have been, for successive years, in millions of gallons:

1883.	1884.	1885.	1886.	1887.	1888.	1889.
13.0	22.2	40.0	75.0	95.0	160.0	203.0

It is expected that this traffic will very largely increase hereafter.

Three years ago a ministerial circular required the French railroad companies to examine the question of establishing water closets on all trains which run more than two hours without a stop of at least ten minutes. Some of the companies called attention to the fact that the execution of this project offered serious difficulties, would require the construction of a considerable number of new baggage cars (in which is placed the water closet of a French train, if it has any), and would "involve expenses out of proportion to the advantages expected;" and finally they reported that the water-closets provided on express trains are very seldom used; which is easy to understand when we remember that the passenger must leave his own car, make a journey to the baggage car during a halt at one station, stay there until the train halts at another station, and then hunt along the train for car No. 11,000, compartment III., or wherever his seat is, which is not always so easy to find.

After hearing the railroad companies, the Minister collected the opinions of the various government inspecting officers, and submitted the whole to the commission which oversees the operation of the railroads. This last has reported, substantially, that it certainly would be a good thing to have water closets, but that there was no pressing necessity for any more, and that the provision of them might be postponed until the time when the baggage cars should come into the shops for repairs. Following this opinion, the Minister of Public Works has issued a circular, admonishing the companies not to lose sight of the water closets, but to introduce them gradually.

Engineers for Brazil.

The following letter, presented at the meeting of the American Society of Civil Engineers of Jan. 7, 1891, was directed to be issued for the information of members.

Brazilian Legation,
WASHINGTON, Dec. 20, 1890.

Since the revolution of Nov. 15, 1889, in Brazil, the need of engineers and surveyors begins to be very much felt in consequence of the great development of the private industries, in which all those available in the country are already engaged.

I am informed that there is now in Brazil a vast field open to foreign engineers and surveyors of experience; I believe therefore that such a communication will be of importance to the members of your association: So I beg to call your attention to the above fact, hoping that you will find the means to convey it to all those who may be interested in the matter.

Mr. Teixeira de Macedo, our Consul-General in your city, whose office is at 1 Pearl street, will furnish any further information that may be required.

To the Secretary of the American Society of Civil Engineers,
J. GOERTMANN WALENTE,
Brazilian Minister,



Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Reports from Washington indicate that the United States Senate Committee on Interstate Commerce is prepared to recommend certain modifications of the pooling clause of the law. It will not do to lay too much stress on this news. Even if the committee should recommend the change, it is by no means certain to pass the Senate, and far from likely to be well received in the House; while the Farmers' Alliance and similar movements are so strong in different sections of the country that the chance for the passage of any measure which these bodies so strongly oppose is remote in the extreme. It is much more likely that the existing statute will be so construed by the Commission and the courts as to admit of certain forms of division of business than that the law itself should be amended by Congress. Under such circumstances any agitation for the latter end is to be deprecated. If you are strong enough to batter a wall down, well and good; if you are so weak that you prefer to slip through a hole, that is the next best thing. If you try to do both at the same time, the noise you make in battering the wall down simply calls the enemy's attention to your attempts to slip through a hole.

It is too early to judge of the probable success of the Western Traffic Association. A great deal has been left to subordinates for decision, and on their action in the next few weeks the question of success or failure will in large measure depend. To some extent this was inevitable. The presidents could not do everything themselves. But they might at least have put themselves more definitely on record with regard to certain questions of policy. Little is said about joint agencies or methods of apportionment of traffic. The declarations under the latter head are scarcely more explicit than those of the "Gentlemen's agreement." One great and important advance has, however, been made in providing for a strong board of commissioners, competent to attend to this matter, with authority to act either separately or together as the circumstances may demand. The presidents have at last recognized that the work of an association of this kind must be largely executive and not merely advisory, and that the maintenance of rates is quite as important as their establishment, if not more so. The general arrangements seem well adapted to the end in view. The territory is judiciously defined; the exclusion of traffic south of the Ohio River being of course due to the existence of a Southern association with sufficient authority to deal with problems in that locality. The exclusion of certain Pacific business may make more trouble, but was probably inevitable. We regret to see the absence of provisions for a clearing house. In the present state of the law it seems as though attempts at division of traffic could be in the long run better managed by such an agency than by any other. Reports and documents sent to a special office as a basis for award of percentages are all very well in their way, but look too much like a definite effort to evade the

law against pools. Anything of that kind makes the status of the association more insecure. To make matters worse, there is a clause in the agreement itself providing that it shall not interfere with the charter rights or obligations of any of the contracting parties. Probably this clause was inserted in good faith as a means of including companies like the Illinois Central, which were reluctant to go into the old agreement on account of objections of this kind. But it will furnish a loop-hole for all sorts of evasion. Any company that objects to the decision of the arbitrators or commissioners on a particular point will be liable to find obligations in its charter which it never dreamed of before. We fear that the adhesion of some companies to the original agreement, which may have been secured by this clause, will be dearly purchased by the loss of power of holding other companies after they have made the agreement.

The account which appears in another column, of a train wreck caused by the dropping of a brake beam, brings to mind the recommendation made in 1889 by the Master Car-Builders' Committee on Standard Brake Gear. In the admirable report of that Committee is a short paragraph on safety attachments. It is as follows:

A safety attachment for holding the beam if the hangers should break is recommended, and it is the opinion of the Committee that it should not be fastened to the beam, but be of such form and so located that it will prevent the beam from falling to the ground. It should be so constructed that the motion of the car will not wear it out and make it useless when most needed. The ordinary safety chain will not answer the purpose, as the continual rattling to which it is subjected wears it out in a short time and renders it worthless.

Certain standards for brake rigging recommended in this report were adopted by letter ballot, but on this recommendation no action has ever been taken. It has been suggested that this matter be taken up at the next convention, and an addition be made to the Rules of Interchange, requiring that brake beams be fitted with safety chains. It would probably be still better to require a safety strap, for the reason given above by the Committee that a chain will soon wear out by the continual friction of the links on each other. A chain has the advantage that it can be made fast to the beam as a rigid strap could not be so conveniently. But if a chain is adopted there should be a standard minimum size and a standard end connection. Safety chains are often seen that are strong enough in themselves but are useless from the insecurity of their attachments. Probably such a provision in the Rules of Interchange could be easily carried. A chain or a strap is now in very common use, and no one would, we should suppose, deny its importance. There could hardly be a more efficient train wrecker than a fallen brake beam. It is only good luck if it does not derail a wheel. If both hangers break, the beam will naturally drop across the track; if, as is more likely, but one hanger breaks the other will hold the beam in front of a wheel until it gets in its work. This kind of accident is so common, the result is so serious and the remedy so cheap and already so much used that there could not be any hardship in putting the screws on careless or parsimonious owners of cars by refusing their stock unless it is fitted with this simple little device.

The Business Situation.

Within a short time there has been quite a general revival of confidence, and the feeling on the part of merchants and manufacturers as well as investors is that the worst is over, and that the ordinary course of business may again be taken up without risk. Of course this is speaking generally. So far as Wall street goes this feeling is indicated by the course of prices.

Below is a table of 17 of the most active stocks on the New York Stock Exchange with prices just before the depression, during the greatest depression, and on Jan. 13. The stocks selected are those of which 10,000 shares or more were sold in the week ending Jan. 9 and the prices are the highest on the dates given. It will be seen that five of these stocks have got back to prices higher than before the "panic," and that all of them have made important advances.

	Oct. 17.	Nov. 19.	Jan. 13.
Atchafalaya	35 1/2	26 1/2	32
Burlington	53	87	93 1/2
Milwaukee & St. Paul	60 1/4	47 1/2	56 1/2
Rock Island	70 1/2	67	72 1/2
C. C. & St. L.	67 1/2	50 1/4	65 1/2
D. L. & W.	14 1/2	13 1/2	13 1/2
D. & R. G., pref.	5 1/4	5 1/4	6 3/4
Lake Shore	107 1/2	104 1/2	108 1/2
Louisville & Nash.	70 1/2	60 1/2	78 1/2
Mo. Pacific	69 1/2	60 1/2	69 1/2
Erie	22 1/2	17 1/2	21
N. Y. & New England	43	31 1/2	37 1/2
North Pacific	27 1/2	21	29 1/2
" " " pref.	7 1/4	6 1/4	7 1/2
Reading	37 1/2	30 1/2	33 1/2
Richmond Terminal	18 1/2	15	19
Union Pacific	52 1/2	45 1/2	48 1/2

A comparison of the prices of bonds would be per-

haps even more significant, as being less speculative. The extreme decline in bonds was not reached so soon as in stocks, but the recovery has been about as rapid and complete. The volume of bond sales the last few days has been larger than for some months, not only on the stock exchange, but by bankers and brokers, some of whom are clearing off lists that they have held for months. This, of course, is the result not only of easier money but of returning confidence; and again, the more plentiful supply of money for investment and business cannot be attributed alone to the re-investment of January interest and dividends. The banks have been less exacting, and loans are somewhat easier.

The table below shows at a glance some of the important facts in the statements of the New York Clearing-House banks before, during and since the "panic":

	Loans and discounts.	Reserve held.	Surplus reserve.
October 11.	\$406,792,900	\$104,840,800	\$3,155,225
November 22.	387,297,200	95,511,000	89,750
November 29.	384,518,100	95,026,900	382,350
December 6.	385,469,500	91,801,400	2,429,650
December 27.	385,321,800	103,237,500	7,725,175
January 3.	385,678,500	115,234,900	8,576,875
			*Deficit.

It will be seen that the reserve has increased very rapidly since Dec. 6, which has given a great sense of security; but the loans and discounts have decreased, indicating a very conservative policy still on the part of the banks. The fact is that business is yet hampered by the difficulty of selling commercial paper, and there is much criticism of the attitude maintained by the banks. Still the discount rate is falling, not only in New York, but in all the great financial centres of Europe, and in banking circles the feeling is generally that the storm is over, and we may suppose that borrowers will soon be able to get their customary accommodation.

The effect of the recent action of the Western railroad presidents has been to increase the feeling of confidence; and this, with the improved financial situation, is encouraging to the manufacturers of railroad supplies of all sorts. They already begin to feel a reaction, although many of them still find some trouble in selling their paper.

On the whole, the outlook is favorable, and the feeling is hopeful. There is, however, one great element of uncertainty which discourages arrangements leading to an increase of obligations or to making long contracts, and that is the prospective silver legislation. Prudent men hesitate while they are uncertain as to what their money is going to be worth in six months. If it were not that the free coinage bill just passed by the Senate is likely to be killed in the House or to be vetoed by the President the business recovery would be much slower than now seems probable.

Reform in Passenger Fares.

The current number of the *Quarterly Journal of Economics* contains an article by Prof. E. J. James, which is much more carefully and well considered than most of the utterances on this subject. The writer does not make the mistake of thinking that there is any virtue in the "zone system" as such. It simply makes 10 kilometres, instead of 1 kilometre, the unit of charge. It is purely a matter of convenience in railroad economy. The ticket agent does not have to keep so many kinds of tickets in stock, and this is about all. The importance of the Hungarian reform lies in the extremely low rates secured, rather than in the form of tariff adopted. While it is too soon to estimate the ultimate effect of the reform on passenger receipts, they are not likely to be over a cent a mile.

We have already shown the error in trying to apply this standard to America. Our population is not nearly so dense as that of Austria or Hungary, and even in those localities which are more thickly peopled the public demands more trains and better trains rather than lower charges. But however mistaken the general application may be, the case is stronger when it is presented in detail. There are some parts of our country where it seems as though decided reductions in charge would be possible, and where the existing rates are actually very high. Let us take an instance as presented by Prof. James:

"From Philadelphia to New York, a distance of 90 miles, the fare is \$2.50, whether one goes by express train or by ordinary passenger, except that for one train an extra fare of \$1 is charged. For the parlor car, in case one is attached to the train, a charge of 50 cents extra is made, except for the one train just mentioned, in which case it is included in the \$1. Free baggage to the amount of 150 lbs. is allowed.

"In Hungary, the charge for 150 lbs. of baggage would be 80 cents; the ticket by ordinary trains, 90 cents, \$1.44 and \$1.80; by express trains, \$1.08, \$1.80 and \$2.16. The fares, then, in Hungary for that distance, with 150 lbs. of baggage, would range between \$1.70 and \$2.96; while between New York and Philadelphia they range between \$2.50 and \$3.50. If the traveler were content

with 120 lbs. of baggage (more than the average traveling trunk weighs), the Hungarian rates would range from \$1.30 to \$2.40. If the rates were taken for shorter distances or for much longer distances, the comparison would be much more favorable to Hungary."

Let us analyze the case a little more in detail. Between New York and Philadelphia the Pennsylvania road runs from 20 to 30 trains a day each way. By the leading route from Vienna to Buda-Pesth there are only five trains. The distance from Vienna to Pesth is nearly twice as great as that from Philadelphia to New York, but the conditions are otherwise substantially the same. Obviously, if the population of New York and Philadelphia were contented with a smaller number of trains, larger loads would be possible. Larger loads would produce better train economy, and by this means the charges could be decidedly reduced. Moreover, the Hungarian trains are run at not much more than half the speed of the American, and the Hungarian public contents itself with slower work at stations and does not object to regulations requiring passengers with baggage to be on hand a long time ahead of the hour fixed for starting. Under all these circumstances the Hungarian service is cheaper than the American in every respect. It costs less to perform and it gives the public less comfort.

What would be the effect if the Pennsylvania Railroad were to cut off half of its train service between New York and Philadelphia? To this question there can be but one answer. The outcry against such a measure would be vastly more intense than any demand for reduction in charge now is. The public would be glad to have lower fares, but it would not be ready to put up with worse train service for the sake of securing it. The facilities of the Pennsylvania road for handling traffic, especially at its New York terminals, are pretty fully occupied at the existing high rates. The company is not allowed to reduce rates by lessening service. As a necessary condition to any improvement, it must devise new means of passenger economy. This seems to be the necessary condition for any reform in rates. Europe could reduce charges instead of extending facilities as a mere matter of traffic policy, and by getting more passengers handled slowly and in larger loads it could make money by the change, or at least not lose money. But with us the case is different. At existing rates we have traffic enough to occupy our facilities fully. We are pretty nearly in the condition with regard to passenger traffic that we were in regard to freight traffic on many lines before the introduction of steel rails. The possibility of reform in fares depends on the possibility of reforms in operation.

In the first place, if we are to carry larger loads we must give up the idea of controlling tickets on the trains. We must punch the tickets at the point of starting and gather them at the point of delivery, and not rely on the train conductor to do the work, except in the case of long distance express travel, where stops are comparatively infrequent. This system is already practiced to some extent on the starting platforms of our suburban lines. It is carried out consistently on the elevated railroad, with the single exception that, the fare being the same for all distances, a deposit of the ticket at the starting point avoids all need of further inquiry. The English lines have carried the plan out completely in the form suggested, collecting the passenger's ticket before permitting him to leave the station at his destination, and not allowing him to get out unless provided with a proper ticket. The idea is foreign to American habits. It would require provision for inclosure of stations, which would involve considerable first cost; but the economy in connection with suburban trains would very likely be large enough to pay its cost many times over. The loss to some roads under the present system must be very great, and tends to grow greater as time goes on.

In the second place, any lowering of passenger fares, if it is to be followed by an increase in travel, demands vastly greater station accommodations and track facilities in the neighborhood of large cities. The time is probably not far distant when the suburban train service will be wholly separated from through train service, as it already is to a great extent on many of our lines. To demand that a two track road with the ordinary station accommodations should try to make money by doubling its suburban passenger service will be seen to be absurd by those who know how inadequate are the facilities for handling such traffic at present.

If, as the would-be reformers suggest, our roads should try to serve their country and themselves by halving their rates, in the hope of doubling their travel, the probable effect would be that in outlying districts the passenger journeys would not increase in proportion to the reduction in fares, and that the gross earnings, already inadequate, would fall rather than

rise. In the neighborhood of large cities, on the other hand, while there might be an increase of travel, it would come at points already overburdened, and could only be met by additional expenditures of costly and questionable character. So far as the prospective cost in the one case or loss of income in the other tended to prevent the increase of number of trains, it is doubtful whether the public would greatly value the gain from the reduction in fares. In any event, the conditions of a country with large railroad development and train service in proportion to its population are totally different from those where railroads are only built in the most thickly settled districts, and where, even in these cases, the train service is far within the possibilities of railroad economy.

Commissions on Ticket Sales.

The Trunk Lines and the Central Traffic Association roads have once more resolved not to pay commissions on ticket sales nor to allow other roads to disturb rates by doing it in Trunk Line or Central territory. The agreement is in no more emphatic terms than the previous ones which have proved ineffective, and it is therefore received with about the same incredulity as those were; but there are some circumstances which lead to the hope that cutting rates by means of excessive commissions may now be fought more effectively than heretofore. If it be true, as we see no reason to doubt, that the Interstate Commerce Commission is ready to sanction, or at least to tolerate strong measures of repression, much can be accomplished by the means now provided.

In the first place, substantially all the roads east of Chicago, both in and out of the association, have joined in the agreement, and both eastbound and westbound business is covered. Provision for more prompt action is made in a clause under which if a line is complained of, and fails to refute the allegations in the complaint as to the payment of commissions on passenger business within fifteen days, all of the other lines in the agreement will refuse to transact any further business with the line violating the agreement. No baggage shall be exchanged, and no through tickets sold; in short, an absolute cessation of exchange business is threatened. Commissioners Goddard and Farmer, of the Trunk Line Association, and Commissioner Blanchard and Vice-Chairman F. C. Donald, of the Central Traffic Association, were appointed a "board of rulings" with power to regulate differential rates.

Commission paying has not latterly caused much disturbance in Trunk Line territory, except on emigrant business out of New York City; but what little disturbance there has been is charged against the roads west of Chicago, and it is against them that the present agreement is aimed. It will be remembered that in 1887 the Trunk Lines refused to sell tickets over Western lines unless the latter would agree not to pay commissions in Eastern territory, and that there was a long fight over the matter. The Chicago & Alton stood out long after all the other roads had accepted the Trunk Lines' terms, and we believe it is still standing out; but for some reason the Trunk Lines resumed selling Alton tickets in the spring of 1889. More or less commission money has continued to come East, and much of it has doubtless gone for sales of first-class tickets; and the Alton would, no doubt, take pride in acknowledging itself to be one of the distributors of this money. But, of course, everything is done as secretly as possible, and it does not appear that outside of New York City the rates have been seriously cut. The report that the local agents of the Pennsylvania had suddenly found themselves free to accept commissions, which was published at Chicago with such circumstantiality a week or two since, is said to have been made out of whole cloth.

It is possible, of course, for an independent road like the Alton to put agents in Eastern cities who will solicit business independently and send passengers to Chicago on tickets purchased of regular Trunk Line agents, and to thus indirectly but surely lead to reductions in Trunk Line fares; but the present move seems to be against roads less honorable or less important than the Alton. The only resource of the Trunk Lines in case of such indirect injury to their revenues is to proceed against the offending roads for selling tickets at less than published rates. Evidence of such crookedness is not easy to get, but the practice is not wholly beyond detection. In Pennsylvania and a few other states an unauthorized agent can be held for selling tickets; but the Interstate Commerce law, while requiring the posting of tariffs at all places "where passengers are received for transportation," does not require the publication of rates at offices off the line of the road. But the Interstate Commerce Commission, as is well known, has long been opposed to the pay-

ment of commissions, and will undoubtedly countenance extreme measures for their suppression. If it has become now so much impressed with the evils of the practice as to encourage the roads to go to the limit of their legal powers in dealing with it, and to look the other way when the roads propose going a little beyond their legal powers, better days for the passenger business are at hand. It is true that the strength of the movement against commission paying, like that of the "Gentlemen's agreements," still depends largely on the honor of the parties interested; but it is gratifying to note that the amount and grade of honor in this field is improving from year to year, whatever may be the state of things among Mr. Stickney's associates.

The New Hungarian Freight Tariff.

The new freight tariff of the Hungarian State railroads, which has been the subject of many conjectures has at last been announced. It is not properly a "zone" tariff, but is, in principle, precisely like the first schedules of rates announced by the Illinois Railroad Commission, the rates being made for distances increasing by 10 kilometres (6¼ miles), with decreasing rates per kilometre for increasing distances. What distinguishes the new Hungarian tariff is the great decrease from the existing tariff, amounting to from 21 to 37 per cent. The following are the rates for a few distances, reduced to dollars and cents per ton of 2,000 lbs.:

MILES.	Regular classes.		Car-load classes.			Special tariffs.		
	I.	II.	A.	B.	C.	1.	2.	3.
Up to 6.....	\$0.53	\$0.43	\$0.29	\$0.19	\$0.19	\$0.21	\$0.19	\$0.19
6 to 12½.....	0.82	0.67	0.38	0.24	0.19	0.31	0.19	0.19
12½ to 18¾.....	1.15	0.91	0.53	0.34	0.29	0.43	0.29	0.24
18¾ to 25.....	1.54	1.15	0.78	0.46	0.38	0.57	0.43	0.34
25 to 31.....	1.78	1.35	0.91	0.56	0.43	0.67	0.53	0.43
31 to 36.....	2.07	1.54	1.04	0.67	0.53	0.78	0.67	0.53
36 to 42.....	2.31	1.78	1.15	0.78	0.67	0.89	0.78	0.67
42 to 48.....	2.55	1.91	1.26	0.91	0.78	1.00	0.91	0.78
48 to 54.....	2.78	2.07	1.38	1.04	0.91	1.11	1.00	0.91
54 to 60.....	3.02	2.31	1.50	1.15	1.04	1.22	1.11	1.00
60 to 66.....	3.26	2.55	1.61	1.26	1.15	1.33	1.22	1.11
66 to 72.....	3.50	2.78	1.73	1.38	1.26	1.44	1.33	1.22
72 to 78.....	3.74	3.02	1.84	1.50	1.38	1.55	1.44	1.33
78 to 84.....	3.98	3.26	1.96	1.61	1.50	1.66	1.55	1.44
84 to 90.....	4.22	3.50	2.07	1.73	1.61	1.77	1.66	1.55
90 to 96.....	4.46	3.74	2.19	1.84	1.73	1.88	1.77	1.66
96 to 102.....	4.70	3.98	2.31	1.96	1.84	1.99	1.88	1.77
102 to 108.....	4.94	4.22	2.42	2.07	1.96	2.10	1.99	1.88
108 to 114.....	5.18	4.46	2.54	2.19	2.07	2.21	2.10	1.99
114 to 120.....	5.42	4.70	2.66	2.31	2.19	2.32	2.21	2.10
120 to 126.....	5.66	4.94	2.78	2.42	2.31	2.43	2.32	2.21
126 to 132.....	5.90	5.18	2.90	2.54	2.42	2.54	2.43	2.32
132 to 138.....	6.14	5.42	3.02	2.66	2.54	2.65	2.54	2.43
138 to 144.....	6.38	5.66	3.14	2.78	2.66	2.76	2.65	2.54
144 to 150.....	6.62	5.90	3.26	2.90	2.78	2.87	2.76	2.65
150 to 156.....	6.86	6.14	3.38	3.02	2.90	2.98	2.87	2.76
156 to 162.....	7.10	6.38	3.50	3.14	3.02	3.09	2.98	2.87
162 to 168.....	7.34	6.62	3.62	3.26	3.14	3.20	3.09	2.98
168 to 174.....	7.58	6.86	3.74	3.38	3.26	3.31	3.20	2.98
174 to 180.....	7.82	7.10	3.86	3.50	3.38	3.42	3.31	3.20
180 to 186.....	8.06	7.34	3.98	3.62	3.50	3.53	3.42	3.31
186 to 192.....	8.30	7.58	4.10	3.74	3.62	3.64	3.53	3.42
192 to 198.....	8.54	7.82	4.22	3.86	3.74	3.75	3.64	3.53
198 to 204.....	8.78	8.06	4.34	3.98	3.86	3.86	3.75	3.64
204 to 210.....	9.02	8.30	4.46	4.10	3.98	3.97	3.86	3.75
210 to 216.....	9.26	8.54	4.58	4.22	4.10	4.08	3.97	3.86
216 to 222.....	9.50	8.78	4.70	4.34	4.22	4.19	4.08	3.86
222 to 228.....	9.74	9.02	4.82	4.46	4.34	4.30	4.19	4.08
228 to 234.....	9.98	9.26	4.94	4.58	4.46	4.41	4.30	4.19
234 to 240.....	10.22	9.50	5.06	4.70	4.58	4.52	4.41	4.19
240 to 246.....	10.46	9.74	5.18	4.82	4.70	4.63	4.52	4.19
246 to 252.....	10.70	9.98	5.30	4.94	4.82	4.74	4.63	4.19
252 to 258.....	10.94	10.22	5.42	5.06	4.94	4.85	4.74	4.19
258 to 264.....	11.18	10.46	5.54	5.18	5.06	4.96	4.85	4.19
264 to 270.....	11.42	10.70	5.66	5.30	5.18	5.07	4.96	4.19
270 to 276.....	11.66	10.94	5.78	5.42	5.30	5.18	5.07	4.19
276 to 282.....	11.90	11.18	5.90	5.54	5.42	5.29	5.18	5.07
282 to 288.....	12.14	11.42	6.02	5.66	5.54	5.40	5.29	5.07
288 to 294.....	12.38	11.66	6.14	5.78	5.66	5.51	5.40	5.07
294 to 300.....	12.62	11.90	6.26	5.90	5.78	5.62	5.51	5.07
300 to 306.....	12.86	12.14	6.38	6.02	5.90	5.73	5.62	5.07
306 to 312.....	13.10	12.38	6.50	6.14	6.02	5.84	5.73	5.07
312 to 318.....	13.34	12.62	6.62	6.26	6.14	5.95	5.84	5.07
318 to 324.....	13.58	12.86	6.74	6.38	6.26	6.06	5.95	5.07
324 to 330.....	13.82	13.10	6.86	6.50	6.38	6.17	6.06	5.07
330 to 336.....	14.06	13.34	6.98	6.62	6.50	6.28	6.17	5.07
336 to 342.....	14.30	13.58	7.10	6.74	6.62	6.39	6.28	5.07
342 to 348.....	14.54	13.82	7.22	6.86	6.74	6.50	6.39	5.07
348 to 354.....	14.78	14.06	7.34	6.98	6.86	6.61	6.50	5.07
354 to 360.....	15.02	14.30	7.46	7.10	6.98	6.72	6.61	5.07
360 to 366.....	15.26	14.54	7.58	7.22	7.10	6.83	6.72	5.07
366 to 372.....	15.50	14.78	7.70	7.34	7.22	6.94	6.83	5.07
372 to 378.....	15.74	15.02	7.82	7.46	7.34	7.05	6.94	5.07
378 to 384.....	15.98	15.26	7.94	7.58	7.46	7.16	7.05	5.07
384 to 390.....	16.22	15.50	8.06	7.70	7.58	7.27	7.16	5.07
390 to 396.....	16.46	15.74	8.18	7.82	7.70	7.38	7.27	5.07
396 to 402.....	16.70	15.98	8.30	7.94	7.82	7.49	7.38	5.07
402 to 408.....	16.94	16.22	8.42	8.06	7.94	7.60	7.49	5.07
408 to 414.....	17.18	16.46	8.54	8.18	8.06	7.71	7.60	5.07
414 to 420.....	17.42	16.70	8.66	8.30	8.18	7.82	7.71	5.07
420 to 426.....	17.66	16.94	8.78	8.42	8.30	7.93	7.82	5.07
426 to 432.....	17.90	17.18	8.90	8.54	8.42	8.04	7.93	5.07
432 to 438.....	18.14	17.42	9.02	8.66	8.54	8.15	8.04	5.07
438 to 444.....	18.38	17.66	9.14	8.78	8.66	8.26	8.15	5.07
444 to 450.....	18.62	17.90	9.26	8.90	8.78	8.37	8.26	5.07
450 to 456.....	18.86	18.14	9.38	9.02	8.90	8.48	8.37	5.07
456 to 462.....	19.10	18.38	9.50	9.14	9.02	8.59	8.48	5.07
462 to 468.....	19.34	18.62	9.62	9.26	9.14	8.70	8.59	5.07
468 to 474.....	19.58	18.86	9.74	9.38	9.26	8.81	8.70	5.07
474 to 480.....	19.82	19.10	9.86	9.50	9.38	8.92	8.81	5.07
480 to 486.....	20.06	19.34	9.98	9.62	9.50	9.03	8.92	5.07
486 to 492.....	20.30	19.58	10.10	9.74	9.62	9.14	9.03	5.07
492 to 498.....	20.54	19.82	10.22	9.86	9.74	9.25	9.14	5.07
498 to 504.....	20.78	20.06	10.34	9.98	9.86	9.36	9.25	5.07
504 to 510.....	21.02	20.30	10.46	10.10	9.98	9.47	9.36	5.07
510 to 516.....	21.26	20.54	10.58	10.22	10.10	9.58	9.47	5.07
516 to 522.....	21.50	20.78	10.70	10.34	10.22	9.69	9.58	5.07
522 to 528.....	21.74	21.02	10.82	10.46	10.34	9.80	9.69	5.07
528 to 534.....	21.98	21.26	10.94	10.58	10.46	9.91	9.80	5.07
534 to 540.....	22.22	21.50	11.06	10.70	10.58	10.02	9.91	5.07
540 to 546.....	22.46	21.74	11.18	10.82	10.70	10.13	10.02	5.07
546 to 552.....	22.70	21.98	11.30	10.94	10.82	10.24	10.13	5.07
552 to 558.....	22.94	22.22	11.42	11.06	10.94	10.35	10.24	5.07
558 to 564.....	23.18	22.46	11.54	11.18	11.06	10.46	10.35	5.07
564 to 570.....	23.42	22.70	11.66	11.30	11.18	10.57	10.46	5.07
570 to 576.....	23.66	22.94	11.78	11.42	11.30	10.68	10.57	5.07
576 to 582.....	23.90	23.18	11.90	11.54	11.42	10.79	10.68	5.07
582 to 588.....	24.14	23.42	12.02	11.66	11.54	10.90	10.79	5.07
588 to 594.....	24.38	23.66	12.14	11.78	11.66	11.01	10.90	5.07
594 to 600.....	24.62	23.90	12.26	11.90	11.78	11.12	11.01	5.07
600 to 606.....	24.86	24.14	12.38	12.02	11.90	11.23	11.12	5.07
606 to 612.....	25.10	24.38	12.50	12.14	12.02	11.34	11.23	5.07
612 to 618.....	25.34	24.62	12.62	12.26	12.14	11.45	11.34	5.07
618 to 624.....	25.58	24.86	12.74	12.38	12.26	11.56	11.45	5.07
624 to 630.....	25.82	25.10	12.86	12.50	12.38	11.67	11.56	5.07
630 to 636.....	26.06	25.34	12.98	12.62	12.50	11.78	11.67	5.07
636 to 642.....	26.30	25.58	13.10	12.74	12.62	11.89	11.78	5.07
642 to 648.....	26.54	25.82	13.22	12.86	12.74	12.00	11.89	5.07
648 to 654.....	26.78	26.06	13.34	12.98	12.86	12.11	12.00	5.07
654 to 660.....	27.02	26.30	13.46	13.10	12.98	12.22	12.11	5.07
660 to 666.....	27.26	26.54	13.58	13.22	13.10	12.33	12.22	5.07
666 to 672.....	27.50	26.78	13.70	13.34	13.22	12.44	12.33	5.07
672 to 678.....	27.74	27.02	13.82	13.46	13.34	12.55	12.44	5.07
678 to 684.....	27.98	27.26	13.94	13.58	13.46	12.66	12.55	5.07
684 to 690.....	28.22	27.50	14.06	13.70	13.58	12.77	12.66	5.07
690 to 696.....	28.46	27.74	14.18	13.82	13.70	12.88	12.77	5.07
696 to 702.....	28.70	27.98	14.30	13.94	13.82	12.99	12.88	5.07
702 to 708.....	28.94	28.22	14.42	14.06	13.94	13.10	12.99	5.07
708 to 714.....	29.18	28.46	14.54	14.18	14.06	13.21	13.10	5.07
714 to 720.....	29.42	28.70	14.66	14.30	14.18	13.32	13.21	5.07
720 to 726.....	29.66	28.94	14.78	14.42	14.30	13.43	13.32	5.07
726 to 732.....	29.90	29.18	14.90	14.54	14.42	13.54	13.43	5.07
732 to 738.....	30.14	29.42	15.02	14.66	14.54	13.65	13.54	5.07
738 to 744.....	30.38	29.66	15.14	14.78	14.66	13.76	13.65	5.07
744 to 750.....	30.62	29.90	15.26	14.90	14.78	13.87	13.76	5.07
750 to 756.....	30.86	30.14	15.38	15.02	14.90	13.98	13.87	5.07
756 to 762.....	31.10	30.38	15.50	15.14	15.02	14.09	13.98	5.07
762 to 768.....	31.34	30.62	15.62	15.26	15.14	14.20	14.09	5.07
768 to 774.....	31.58	30.86	15.74	15.38	15.26	14.31	14.20	5.07
774 to 780.....	31.82	31.10	15.86	15.50	15.38	14.42	14.31	5.07
780 to 786.....	32.06	31.34	15.98	15.62	15.50	14.53	14.42	5.07
786 to 792.....	32.30	31.58	16.10	15.74	15.62	14.64	14.53	5.07
792 to 798.....	32.54							

Freight Rates Under State Control of Railroads.

There is complaint in France that the freight rates of the railroads are so numerous and complicated that it is impossible for any but an expert to know or to find out what the most advantageous rates are for shipments which go beyond the lines of the company to which the freight is first delivered. A recent writer, while acknowledging that the companies have done their best to meet the requirements of business, giving special rates where needed to enable goods to move, says that this very readiness to meet all requirements has been a chief cause of the complication, by multiplying rates. Every week the companies propose new rates, and most of these receive the indorsement of the Ministry of Public Works, which is necessary before a rate can be put into effect. All the tariffs, it is true, are published in the huge volume of the rates; but every special tariff giving reductions from the regular rates is granted only on certain conditions, so that to know what rate is applicable, one must know these conditions. Each company is obliged to apply the lowest rate to a given shipment if the shipper requires it, provided the whole movement is on its own lines; but its agents are not supposed to know all the rates of all the other roads, and when it has been proposed to require the agent at the consignor's station to quote a through rate, the companies have responded that it is too much to expect that their agents should know all the rates of all the companies; to which the public responds that if the railroad agents cannot keep track of the rates the shippers certainly cannot be expected to. A writer in a Marseilles newspaper sums up as follows what they must know in order to be able to select the lowest rate for a shipment: "In the first place, we must study the conditions governing the application of the general tariffs, then master the classification of goods carried at these rates on such conditions; know the tables of general and special rates, the stations and distances, the classification of goods carried at special rates, the special rates themselves with their separate classifications and their fixed rates from station to station [in distinction from rates for given distances applicable to all stations of the same company]; also the joint rates of different companies, etc., etc. In fact, it is almost impossible."

The companies are bound to pay back the difference if the freight actually paid exceeds what could have been attained by another tariff or combination of tariffs issued by the company at whose station the shipment is made; that is, a tariff for its own line or a joint tariff for some route composed of its own and a connecting line; but the ordinary shipments over connecting lines are not made under a joint tariff, but by the general tariffs of the different companies over whose lines the freight passes, and in this case the shipper must himself select the tariff on the connecting lines. If he does not select that one which would give the lowest charge, he has no remedy. As all competition of the different railroads with each other is carefully avoided, there are not at French cities the abundance (super-abundance) of agents who force upon the attention of our shippers the routes and rates by which any advantage may be had, and enable him to ascertain the lowest rate to almost any station in the country, simply by asking one or two men.

A cylindrical car all of steel is now on exhibition at the Lake Shore Station in Chicago. It was begun a few years ago at the Atlantic Works, East Boston, by a poor inventor, who had not money enough to finish it, and parts of it were consigned to the scrap heap. Messrs. Bird & Atkinson afterward took it up, and it was completed in Laconia, N. H. The car is made in the form of a cylinder about 53 ft. long x 9 ft. 9 in. in diameter, and is carried on two four-wheel trucks. A plan of hot air heating is used with two furnaces under the car. The segment formed at the bottom of the car by the level floor supplies a very good chamber for the hot air pipes. The ventilation of the car is excellent. Fresh air is freely admitted through shafts from the top of the car down between the windows, and is heated by passing over hot pipes, and flows up through registers in the floor. Ample escape is also afforded for the vitiated air at the top of the car. A simple device admits the opening and closing of the dampers of the furnace from either platform. The disposition of the room inside the car is good, and well adapted to a private car. The cylindrical form is more apparent from within the car than from without; the ventilators, windows and platforms detracting much from the symmetry of the outside. The entire car, ceilings and sides are carefully and elaborately cushioned, and it is claimed, were the car to be overthrown, the passengers could not be seriously injured. This point cannot be conceded, however, as the large windows of glass at either side, wholly without protection, would cause trouble in a wreck. The middle compartment is arranged with a narrow aisle at the side and transverse seats after the European style; at one end is a small apartment for three persons, at the other a very attractive sitting room accommodating 15 to 20 persons comfortably. The cost of the car was said to be about \$40,000 up to September, 1889. A considerable number of these cars could be produced for a less cost for each.

Representative Anderson, of Kansas, has introduced in the lower house of Congress a resolution calling on

the Interstate Commerce Commission to tell what it thinks about the new agreement formed by the roads west of Chicago; whether it is a combination to control charges; whether it has power to control them, and, in general, what the effect will be on the public of this "combination."

NEW PUBLICATIONS.

Applied Mechanics. By Gaetano Lanza, Professor Theoretical and Applied Mechanics, Massachusetts Institute of Technology. John Wiley & Sons, New York, 1890. Price \$7.50.

This is one of the best works on Mechanics that has appeared. It is primarily a text book, and is the result of experience in teaching for the last twelve years at the Massachusetts Institute of Technology, and, as stated by the author, the subjects are presented in the way that seems best for the progress of the students, "even though it be at some sacrifice of a logical order of topics."

A new explanation of the meaning of the word "force" is given with the object of calling the student's attention to the many meanings which have been given to this term. The author says: "Correct definitions are only gradually developed. . . . Starting with very imperfect and often erroneous views of natural laws and phenomena, it is often after these errors have been ascertained and corrected by a long range of observation and experiment and an increased range of knowledge has been acquired, that exactness and perspicuity can be obtained in the definitions." The author states that two facts are considered which have hitherto been neglected: (1) All our ideas of space, time, rest, motion, and even of direction, are relative. (2) Because two effects are identical, it does not follow that the causes producing those effects are identical. He concludes with the following definition of force: "Force is a tendency to change the relative motion of the two bodies between which that tendency exists." A full understanding of this definition requires much thought, but when completely comprehended many perplexing problems of common mechanics become simple.

Writing of motion, the author says: "The limitations of our natures are such that our quantitative conceptions are relative. . . . We have, moreover, no means of determining whether any given point is absolutely fixed in position, nor whether any given direction is an absolutely fixed direction." A clear idea of what is meant by these statements is so essential to the modern student and will remove so many doubts and be of so much assistance in dynamics, that the point might be enlarged upon with advantage.

In the treatment of the theory of beams there is a decided improvement over the common methods, more noticeably so because of the increased attention paid to the longitudinal shearing. Particularly is this true in the treatment of wooden beams, to which Professor Lanza has paid so much attention. He has given to the world many valuable results of tests of full sized beams. He emphasizes the necessity of using full sized test pieces in order to obtain constants of strength and elasticity for practical use.

The principal differences between this and the early editions of this work lie in the increased amount of data from experimental work. We would recommend to all interested in such matters a perusal of the chapter on wind pressures. It contains all the information extant that can be relied upon as a guide in making calculations of air pressures. The author is in possession of most of the data yet derived from tests made with dynamometer cars and other apparatus for measuring air resistance, and has gathered in this volume such results of the study of these data as, in his opinion, can be relied upon as a basis for practical estimates.

If there is any one criticism that might be made of this book it is the lack of conclusions at the end of each article. The engineer, no matter how much of a student he may be, will lose his facility with mathematical formulae, and yet he will cling to the text book which he used in school as the most convenient authority, and one with which he is the most familiar; and although such a work as this is not intended to be used as a handbook for engineers, yet all graduates who have studied it will feel so much more familiar with its contents than with the contents of other books that it must become to them a book of reference and as such they would find it more useful if the conclusions were expressed in plain English rather than in formulae.

The chapter on the riveting of steel plates and the strength of flat plates supported in various ways will be found useful to railroad engineers, including as it does nearly all that is known on these subjects.

Mechanics of Engineering and of Machinery. By Dr. Julius Weisbach. Volume III. Part I. Section II. *The Mechanics of the Machinery of Transmission.* Second edition, thoroughly revised and greatly enlarged by Gustav Herrmann, Professor at the Royal Polytechnic School, Aachen, Germany. Translated by J. F. Klein, D. E., Professor of Mechanical Engineering, Lehigh University, Bethlehem, Pa. New York: John Wiley & Sons. 1890. Price, \$5.00.

As the title indicates, this work is a translation of the second section of Prof. Herrmann's revision of the third volume of Weisbach's "Mechanics of Engineering and of Machinery." The first section, of which Prof. Klein's translation has reached a second edition, contains the first three chapters of the volume, and treats of

journals, shafting, couplings, bearings, gearing and linkages.

This section, beginning with the fourth and ending with the ninth chapter, deals successively with the design and construction of ropes and chains, screws, crank trains, cam trains, engaging and disengaging gear, and regulators.

These subjects are treated clearly and in Weisbach's characteristic manner, rather diffusely; the chapters on crank trains and governors being somewhat exhaustive and containing descriptions of special devices, some of which are of hardly more than historical interest. The practical examples given throughout add greatly to the usefulness of the work, and the references to the foreign literature of the subject are quite complete up to the date of revision; though it is to be regretted that the translator did not think it advisable to add references to the late technical literature in our own language.

Altogether the translation is a valuable addition to English works on the mechanics of machinery. The illustrations are good, there are a good table of contents and index, and typographically the volume has the neat appearance which we have learned to expect in the publications of John Wiley & Sons.

Valve Gears. By H. W. Spangler, P. A. Engineer U. S. N., and Whitney Professor of Mechanical Engineering in the University of Pennsylvania. New York: John Wiley & Sons, 1890. Price \$2.50. 165 pages.

This work is written more especially for student and class use, and is designed to give, in a single volume, such portions of the theory of valve gears found necessary to a clear understanding of the subject by the student. A majority of the methods, rules, etc., are taken from reliable authorities, text books and periodicals, a minor portion being original. The analysis of the several valve gears is by the Zeuner diagrams. All of the leading gears are discussed and illustrated, a valuable portion being devoted to shaft governors and valve regulation thereby, among which are exhibited the gears of the Erie City Iron Works, of Armington & Sims, of the Ball engine and those of the Buckeye Engine Company.

Considerable use is made of higher mathematics throughout the book, which, although of use to institute and college instruction, is clearly beyond the reach of a majority of practicing engineers.

Notes on Gas Light and Gas Fittings. Pamphlet, 54 pages.

The Disposal of Sewage of Isolated Country Houses. Pamphlet, 28 pages.

Architecture and Sanitation. Pamphlet, 12 pages. By William Paul Gerhard, C. E., 38 Union Square, New York City. Published by the author.

Mr. Gerhard has been an industrious writer on topics more or less in the line of the three titles of which appear above. His published list embraces a dozen pamphlets and one or two books, all of which are written with simplicity and clearness and practical knowledge.

TECHNICAL.

Manufacturing and Business.

A company to be known as the Bellaire Bridge & Boiler Co. has been formed at Bellaire, O., and will soon be chartered.

The Dominion Bridge Co., of Montreal, has been awarded the contract for the caisson of the dry dock at Kingston, Ont.

The Consolidated Car Heating Co., of Albany, N. Y., has recently got the contract to equip 300 of the passenger cars of the Minneapolis, Sault Ste. Marie & Atlantic with its system of steam heating.

The Peerless Rubber Mfg. Co., 34 Murray street, New York, is putting on the market an improved brand of air brake hose known as the O. of R. C. It is made in 2-ft. lengths, with capped ends, seamless tube, and each piece is tested at 800 lbs. pressure per square inch. It is guaranteed for two years. C. H. Dale, general sales agent, reports gratifyingly large sales.

F. A. Stinard has been appointed Manager of the Northwestern office of the United States Metallic Packing Co., of Philadelphia, with office at 614 Rialto Building, Chicago.

Iron and Steel.

At a meeting in New York of the officers of the Scranton Steel Co. and of the Lackawanna Iron & Coal Co., of Scranton, a preliminary agreement was drawn up for the consolidation of the rail mills of the two companies. A new organization will probably be formed. The stockholders of the companies will soon vote on the agreement.

The Nicaragua Canal Bill.

A bill has been introduced in the Senate by Mr. Sherman from the Committee on Foreign Relations, amending radically the act under which the present canal company is operated. It is proposed by this bill to lend the credit of the government to the canal scheme by guaranteeing the payment of both principal and interest of a new issue of bonds to take the place of all outstanding obligations of the company. The bill was reported by an unanimous vote in the committee and the reasons for this action are clearly set forth in the report which accompanies the measure, a digest of which is given herewith. The capital stock of the company is to be limited to \$100,000,000 and the existing stock and contracts of the company are to be made to conform to the requirements of the bill. The company is authorized to issue bonds not exceeding \$100,000,000, to be dated Jan. 1, 1891, payable Jan. 1, 1901, with interest at three per cent. payable quarterly; bonds to be secured by a first mortgage on the property and rights of the canal company and the mortgage to be so framed as to be a first lien under the laws of Nicaragua and Costa Rica. The bonds will bear the guarantee of the United States for principal and interest as it accrues, and the company is to issue no other bonds. On the failure of the company to

pay the interest as it becomes due the government will pay the interest and the company shall repay the money advanced, with interest at four per cent. until repaid. For sums paid by the United States under the guarantee the United States is to be subrogated to the rights under the mortgage which the bondholders would have had if the same had remained unpaid by the company, and had not been paid by the United States.

After surrender and cancellation of the stock the Secretary of the Treasury is to deliver to the company guaranteed bonds to an amount equal to the sum expended by the said company and the Nicaragua Canal Association prior to Jan. 1, 1891, in securing possession, promoting the enterprise and constructing the canal, together with interest on such amounts from the date of payment, not exceeding the total amount of \$4,000,000. He is also to deliver to the company guaranteed bonds to an amount equal to the money actually paid out and expended by the company in the construction of the canal from and including Jan. 1, 1891, to the final adjustments of the account, with interest thereon at 6 per cent.

Seventy million dollars of shares shall be held in the treasury as a pledge to the United States for the repayment on demand of any sum paid under its guarantee, and the Secretary of the Treasury, on behalf of the United States, may at his discretion vote such stock at any stockholders' meeting, and the United States shall at any time before the maturity of the bonds have the option, at the discretion of Congress, to purchase at par value all or any part of the stock so hypothecated. The United States may apply in payment for such stock the sums paid under the guarantee, and the remainder of the purchase price of the stock shall be applied either for the redemption of the bonds or for a sinking fund.

Six of the 15 directors of the company shall be appointed by the President, with the consent of the Senate; these government directors shall not be stockholders, and shall report to the President.

The Pintsch System of Car Lighting.

We are always glad to note the progress of the Pintsch system of lighting cars by compressed gas. The Chicago & Northwestern has decided to replace the kerosene oil lamps in its passenger cars with the Pintsch system, and is erecting its own gas works. We are told that still other large roads have decided to take this step. This is a movement which will be greatly accelerated by the increase in the number of works distributed through the country. One great obstacle has always been the difficulty of recharging cars which have to make long round trips. The number of gas works for furnishing Pintsch gas has within the last year largely increased. Works have recently been erected in New York City, Jersey City, Syracuse, Boston, Cincinnati, St. Louis, Denver, Ogden, and Atlanta. In several instances the Pintsch Company has erected the plant itself, and we believe that it is now a part of the policy of that company to manufacture and sell gas, in cases where the railroad company does not care to put up its own plant. It has always seemed as if such a policy would be a profitable one for the company.

The United States Block Signal.

The Martin Anti-Fire Car Heating Co., of Dunkirk, N. Y., has secured the control of the United States Automatic Block Signal, which was fully described and illustrated in the *Railroad Gazette* of Nov. 7, 1890. The company will soon be prepared to make contracts to equip either single or double track with this apparatus, which has been in use for more than six months on the Wisconsin Central tracks in Chicago.

A Staten Island-Brooklyn Tunnel.

Last Tuesday night Mr. Erastus Wiman in a speech before the Union League Club of Brooklyn outlined his scheme for a tunnel to connect Staten Island with Brooklyn. The project is essentially that which Mr. L. L. Buck, C. E., suggested in the *Railroad Gazette* of Oct. 31, 1890. Mr. Buck's plan was accompanied with a map showing the railroads approaching New York from the north and west and a line connecting them, across Staten Island, the Narrows and the East River to Westchester. Mr. Wiman's plan is to run a tunnel from a point opposite Stapleton, on Staten Island, to Bay Ridge, on Long Island, where the water is not more than 45 ft. deep. The distance between the shores here is about 1½ miles, and it is believed that a tunnel between four and five miles long, including the approaches, would be efficient. The cost of this is estimated at about five million dollars, while seven million is set down as the total sum necessary to make the tunnel and secure proper connections and pay for tracks and equipment.

Automatic Couplers in Michigan.

The Michigan law reads that "no freight car shall be run upon any of the railroads of this state after Jan. 1, 1891, unless furnished with safety couplers as provided by this act." In view of the magnitude of the task required by the law, the forthcoming report of the Commissioner of Railroads will recommend that the law be so amended as to extend the time for equipping the freight cars with safety couplers for three years, but that all new cars and cars of certain dimensions taken to the shop for repair shall be equipped with the approved safety coupler. The commendable effort and progress manifested by most of the leading companies in complying with the law is shown by the number of cars each company has thus equipped; but the number of men daily killed or injured in coupling cars is so great that it is believed that regard for humanity requires that every possible effort should be made to do away with the cause of such accidents.

A Word for the Baker Heater.

Although the Baker heater gets but little attention in the technical press nowadays, it is still the standard on most of the roads of the country, and to it the traveling public owe much of the safety and comfort that they now enjoy so far as heating apparatus goes. Extensive as has been the use of systems of continuous heating, the cars equipped with them are very few in number as compared with those equipped with the Baker heater. It gives us pleasure, therefore, to give space to the following facts, which have been sent to us by Mr. W. C. Baker, President of the Baker Heater Co.

Some time ago an account was published of the explosion of a Baker heater in one of the cars of the Chicago & Grand Trunk. Mr. Baker secured from the company the following information: "The heater was one of our own heaters, what we call old style, put in by the Great Western Company about two or three years ago. The safety valve was a spring valve of your own type. The cause of the accident was low water and red-hot coil and the safety valve being stuck." In reply to this Mr. Baker wrote the following letter: "First you speak of 'one of your old style heaters.' It was one of our

old style heaters 20 years ago, and we still furnish it once in awhile, but under protest. We know nothing about the company who put the heater in—never heard of it before.

"You refer to the 'spring safety valve' as 'one of your own type.' We make no spring safety valve of any kind. Ours is a vent in a single piece, and without a joint. With this on your heater it would not have blown up. If you use a spring valve the water is always leaking through it, wasting; and of course the water will get low, and the generator coil will burn out, and the heater likely blow up. "So far as we can see, there was nothing about the bursted heater that belongs to our Baker heaters; and, so far as the 'spring safety valve' is concerned, it was not a Baker heater at all."

Mr. Baker has also handed to us the following "protest against tampering with the Baker heater": "Every railroad man in the civilized world knows, or ought to know, that the Baker heater has been, and now is, the main reliance for heating nearly every first-class car. But it is the target for every aspirant for car heating fame in the land. It is the source of all the merit credited to the almost innumerable devices clamoring for public recognition; and the most unfair feature of it all is the fact that all the credit they get comes from, and is a discredit to, the Baker heater. "We respectfully request that the Baker heater be left alone. The Baker Heater Co. will take good care of it. Let every heater stand on its own reputation. . . . It is the heater that is broadly known that gets the discredit for every shortcoming or defect apparent in it, and the attachments made to the heater by way of attempted improvements, by outside parties, are at the present time the cause of all, or nearly all, of the complaints against the Baker heater."

The Chicago Ship Canal.

Chief Engineer Worthen and General John Newton, consulting engineer, have submitted a report to the Trustees of the Chicago ship canal, recommending a definite route from Joliet nearly to the city limits of Chicago. The report was adopted, and immediate proceedings for condemnation were ordered. The cost of the waterway is estimated in the report at \$25,700,000, the channel being 180 ft. wide and 18 ft. deep, with vertical sides of rubble masonry. The route selected is along the Ogden ditch line to the Desplaines Valley, crossing the river near Summit, and following the west side of the river to Joliet. A grade is provided of four-tenths of a foot a mile. If part of the channel is excavated with a depth of 14 ft., the cost is estimated at \$22,700,000. The time of construction is estimated as four years.

THE SCRAP HEAP.

Notes.

A committee of Wabash trainmen has visited St. Louis to confer with General Manager Hays respecting a readjustment of rules and regulations, and the scale of wages.

The Baltimore & Ohio is reducing its force at the Mount Clare shops. One hundred and twenty men, of whom 96 are woodworkers, were discharged last week.

The officers of the Canadian Pacific are now engaged in selecting the remainder of the company's original land grant in the Northwest. About 10,000,000 acres remain to be chosen.

An express car on a night train of the Michigan Central was entered and robbed between Chicago and Detroit on the night of Jan. 6. It does not appear, however, that there was much valuable freight in the car.

In the Circuit Court at Jackson, Miss., Jan. 10, the Railroad Commission secured judgment against the Alabama & Vicksburg Railroad for \$500 for failure of the company to post bulletins of the arrival and departure of trains, as required by law.

The trainmen of the Northwest system of the Pennsylvania Company have presented formal requests for increased pay, and a similar action has been taken by committees from the trainmen, switchmen, engineers and firemen on the Indianapolis division of the Pennsylvania lines.

Committees of trainmen of the Baltimore & Ohio have been in Baltimore several weeks negotiating for an advance in wages. It is now given out that a compromise has been reached, a moderate advance being granted. Freight conductors were advanced from \$2.75 to \$2.90; brakemen from \$1.90 to \$1.95 per trip.

The engine and one car of a passenger train on the Meriden, Waterbury & Connecticut River road fell through a trestle into Little River, near Westfield, Conn., on the morning of Jan. 12. The trestle had been weakened by a freshet. Several men went down with the wreck, but no one was seriously injured.

In the United States District Court at Omaha, Jan. 9, a temporary injunction was issued against the Union Pacific and the Omaha & Republican Valley roads, forbidding them to interfere with the traffic of the Chicago, Rock Island & Pacific between Council Bluffs and Lincoln and Beatrice, and all intervening points.

A coroner's jury at Philadelphia has censured the Pennsylvania Railroad for the death of a boy 10 years old, at a crossing, who it is believed was led to assume that no train was approaching because the gate was open; and the testimony shows that the gate was of a new design, had been put up for experiment, and had never been in operation.

Mayor Cregier, of Chicago, has notified the chief officers of the Illinois Central, Baltimore & Ohio and Michigan Central roads, the American Express Company and the Exposition Company, that they must remove their respective buildings, tracks and other incumbrances from the city's property on the lake front within 60 days from Dec. 29, the date of the vacating ordinance passed by the Council.

The employees of the Chicago, Milwaukee & St. Paul, who are members of the Order of Railway Telegraphers, have been notified that they must leave that organization. The company has also reduced the pay of some operators and they have complained to General Manager Earling, but he has refused to recede from his position. He says that at the towns on the line operators have been paid \$50 per month, besides being furnished with dwelling houses, fuel and light, while in the large cities the pay has been only \$60 per month, without extras. The recent order was made to equalize wages between the agents in cities and those in small towns.

After a five days' conference between the officers of the Chicago, Milwaukee & St. Paul and the brotherhoods of locomotive engineers and firemen, it is announced that these employees on this road have been granted a substantial increase in pay. It is said that the company has agreed to pay the engineers \$3.70 on eight-wheel engines and \$3.85 on ten wheelers for 10 hours' work. For the same time the firemen are to re-

ceive \$2.20 on eight-wheel engines and \$2.40 on ten-wheelers. These were the wages previously paid for a run of 100 miles, with no extra pay for extra time consumed over 10 hours or under 13½ hours. By the new agreement the men are to be paid proportionately for every additional hour over 10 required to complete a 100-mile run. The company agreed to allow the yard engineers and firemen at St. Paul, Minneapolis, and Milwaukee the same wages that are paid in the Chicago yards.

Foreign Notes.

According to the *Bulletin des Adjudications*, an 800-ft. bridge is to be built over the Nile between Mansourah and Talkha, in Egypt. Proposals will be received at the office of the railroad department, at Cairo, up to noon of Feb. 15, 1891.

A French exposition will be opened at Moscow, Russia, on May 1 of this year, and will continue until Oct. 15. French manufacturers expect that the advertisement which will thus be afforded to French goods in Russia will have an important influence in stimulating their export trade to that country.

The artificial waterways of Russia, comprising canals and rivers made navigable by more or less extended engineering work, have a total length of about 3,726 miles. This comparatively small mileage is explained by the existence of the network of naturally navigable rivers and the several short ship canals which establish direct communication with the sea.

The executive committee of the General Italian Exposition, to be held at Palermo next autumn, has decided to have, in connection with it, a special international exhibit of motors of low powers for small industries. For some time past small industries have been much developed in Italy, and it is thought that that country promises to offer a good market for engines of the kind in question.

Among the French exhibitions to be held this year *Le Moniteur Industriel* notes that to be opened at Lyons on Feb. 18. It is to be devoted to the fine arts and has been organized by the Lyons Society of Fine Arts. It will be open to all foreign arts. Another exhibition devoted to the industrial, commercial and agricultural interests, and to the fine arts also, will be held at Bordeaux, the exact date not being given.

According to German account prominence is again being given to the project of establishing a Bulgarian steamship company, with headquarters at Varna. The object in view is to connect the Bulgarian ports on the Black Sea, Varna, Burgas, Kavarna and Baltschik with Constantinople. The capital of the company is to be 1,000,000 francs, and an agreement for a period of 30 years is to be entered into. In view of the fact that the project is looked upon favorably by the Bulgarian government, its promoters entertain hopes of a government subsidy.

A plan to secure passenger railroad transportation at reduced rates has been submitted to the French department of public works and to the several large French railroad companies by Mr. G. Dorville. The plan would seem to be a somewhat modified mileage ticket system, 10 passengers subscribing for a certain mileage (not less than about 620 miles per month), for periods of three months, six months, or one year, and, in return, enjoying the privilege of traveling at their will over any of the railroads in the combination. The reduction from the current rates of fare would range between 40 and 75 per cent.

Railroads in Asia Minor.

For several years Smyrna, the principal commercial point on the coast of Asia Minor, has had two railroad companies who have slowly but steadily extended their lines from that city into the interior.

Since last year one of these, the Ottoman Railroad Company, has opened 117 kilometres (about 73 miles) of new road, part of this being a prolongation of the main line from Kizil Kaklik to the temporary terminal at Dinair, and the remainder, a branch line from Sultedsch to Chivril. The total mileage of this road is now about 280 miles. With the exception of the section between Smyrna and Paradies, the roads have only a single track. There are now under construction 30 kilometres of road between Balatschik and Sokia, and between Gondscheil and Denizli, both of which sections are nearing completion.

The main line reaches the highlands after leaving Saraköi, these reaching an elevation of several thousand feet. The present terminal, Dinair, is an insignificant Turkish village of 800 inhabitants, but its good location, it is thought, gives promise of its early development.

The other railroad, known as the Smyrna-Cassaba Co., has since last year opened the 54-mile branch from Magnesia to Sorna, and its total length now amounts to 235 kilometres (about 165 miles).

It is pointed out as a somewhat remarkable circumstance that notwithstanding this growth of the railroad systems of the country the caravan traffic has, of late, gained in extent. This is explained by the comparatively high railroad freight rates, which considerably exceed the cost of camel transportation.

A Puget Sound Shipyard.

Captain McDougall, manager of the Steel Barge Company, Duluth, Minn., proposes to establish a shipyard on Puget Sound for the building of steel whaleback vessels for Pacific coast trade.

Progress in England.

The Great Western Railway Co. (England) has constructed a train of long passenger cars having through communication from one end of the train to the other, and is running the train experimentally between Paddington and Swindon.

Report of New York Railroad Commissioners.

The New York State Railroad Commissioners in their annual report to the Legislature say that there were 2,335,489,033 passengers carried one mile on the roads of the state, not including elevated roads, during the year, which was an increase of 2.33 per cent. The average earnings per passenger per mile amounted to 2.28 cents, while the expense of carrying each passenger a mile was 1.48 cents. During the year the board disposed of 23 cases referred to it by the Governor or the Legislature. The record of accidents shows 605 persons killed and 1,434 injured; of the killed 241 were employees, and 97 of them met death while walking on the tracks; and 25 were killed and 497 injured while coupling cars.

The enactment of the following laws is asked for:

An act with regard to grade crossings; to prevent railroads hereafter constructed from crossing highways at grade; to prevent new highways being opened over rail-

roads at grade; to provide for the separation of grades between railroads and highways at present grade crossings. An act to prevent the unnecessary duplication of railroads. An act to prevent discrimination by railroads against shippers by canal. An act to establish the responsibility of railroad corporations for damages by fire communicated from their locomotive engines.

Report of Connecticut Railroad Commissioners.

The report of the Railroad Commission submitted to the Legislature Jan. 8 calls attention to the defective legislation adopted two years ago concerning the abolition of grade crossings. In general the effect of the statute has been in favor of a continuance of the objectionable system. The law required railroad companies to remove each year at least one crossing for every 60 miles of road operated. There were only four companies in the state that could be compelled to eliminate crossings. The New York, New Haven & Hartford could be required to remove six crossings during the year, the New York & New England four, the Housatonic two and the Central New England & Western one. At the close of the year the New York, New Haven & Hartford was the only one in the state that had complied with the law. All but two of the crossings eliminated since the law went into effect were on that company's lines. Thirteen crossings have been abolished on the Shore Line and 11 on the New York & New Haven division. Electric signals and flagmen have been stationed more generally than usual at grade crossings along the lines of this system. The remaining roads of the state have done nothing for 18 months.

The total number of employees injured in Connecticut was 335, of whom 264 were trainmen; of the latter 119 received their injuries while coupling or uncoupling cars. Twenty-nine employees were killed. Thirty-six passengers were injured, six of the number fatally, during the year. The total length of roads in the state is 1,006 miles, and of double track 207 miles. The increase in net earnings for the year amounted to \$1,273,688. Nearly half of this amount, \$634,608, was reported by the New York, Providence & Boston.

The law regulating locomotive whistling has been found to be defective in respect to the force of an order issued by the Commissioners. In the case of the Central New England & Western it was discovered that an order made by the Commissioners upon a railroad company cannot be binding upon its lessee. An amendment of the statute relating to this defect is recommended. The Sunday train law has been enforced, the running of trains on Sundays having been allowed only in special exigencies. The New York & New England during the recent freight entanglement was compelled to violate the statutes, and unauthorized trains have been run on the Central New England & Western on two occasions through ignorance of the law. The enforcement of the Sunday law is approved by the Commissioners.

The Scotch Strike.

A Glasgow dispatch of Jan. 12 says: Another week of the railroad strike has commenced with no material change in the situation. The Caledonian officials issued a notice promising to consider the grievances of the strikers who would promptly resume work. In reply to this a number of engine-drivers and firemen returned to work and a small riot ensued. The road is, however, now fully manned with new men. The centres of the disaffection are at Edinburgh, Perth, Aberdeen, Sterling and Dundee. At Motherwell, Hamilton and Polmadie, where the men have been slowly reinstated upon accepting the terms of the railroad companies, the strikers are giving the greatest trouble. At Motherwell a few of the new hands have deserted the road. The roads intend to make a temporary reduction of the passenger service so as to enable them to overtake the goods service. The directors of the North British Railway have announced that their efforts to effect an arrangement with the men on strike have proved fruitless. The position of this road is still very bad, and it seems probable that it will lose a considerable portion of its traffic and that the Caledonian will be the gainer by it. The directors of the several railroads have repeatedly announced that the strike was practically over, that the strikers were beaten, and that the usual traffic upon all the lines had been resumed. In and about this neighborhood there are still about 6,000 men out on strike, and, in spite of the statements made by the companies' representatives, the freight traffic is not being improved. On the other hand, the strikers are continually receiving financial and moral support from the various trade unions throughout Great Britain.

The Engineers' Club.

A report of the board of management of this club (New York City) indicates the extraordinary prosperity of an institution which has been established but about two years. In 1888 the membership increased 136, making a total of 508 members. The income of the club was \$21,000 and the expenditures \$18,328. It is probably well known that this is purely a social club, but it has already become a headquarters for engineers and men in business more or less closely allied to the engineering profession.

Michigan Railroad Commissioner's Report.

Railroad Commissioner J. T. Rich, of Michigan, in his annual report, says there is an increase of 836 miles of track over the previous year. The total mileage operated in Michigan is 7,019. The total income of Michigan railroads has increased 20 per cent. The net income is \$6,136,681 above that of the preceding year, equivalent to 24 per cent. The personal casualties during the year were 512, fatal results occurring in 178 cases. The taxes received amount to \$757,234, an increase of \$45,106 over last year.

Proposed Amendments to the Interstate Commerce Law.

The Senate Interstate Commerce Committee has agreed to report favorably to the Senate a bill modifying that section of the Interstate Commerce Law which forbids pooling, so as to permit limited pooling of traffic. It is proposed to provide that common carriers may enter into contracts or agreements to apportion among them the carriage of freight and passengers. The contracts when filed with the Interstate Commerce Commission shall be binding, and any party to any agreement who fails, refuses or neglects to abide by its terms shall be punished by fine or imprisonment, or both, in the discretion of the United States courts. This committee also agreed upon an amendment relative to joint rates, acting on the recommendation of the Interstate Commerce Commission in its last annual report. This bill provides that every common carrier at the request of any other common carrier shall afford facilities for through traffic at through rates or fares. When a common carrier desires to form a through route for interstate traffic over its own line in connection with the line of other carriers it shall address a request in writing to

the other carriers and to the Interstate Commerce Commission. If within ten days no written objections to the request are filed with the Commission, the request shall be considered as agreed to, but in case objection is made the Commission shall have power to hear and decide the matter. In apportioning the through rate the Commission shall in no case compel any company to accept lower rates per mile than those which such company may, for the time being, legally be charging for like traffic between the same points.

Mechanical Training in Mexico.

The Executive has applied to Congress for authorization to spend what may be necessary for the purpose of establishing in the Federal District a school for the practical training of young men in the handling of steam engines in general, but more particularly of locomotives. This school will be under the control of the Department of Public Works. The course of study will comprise the elementary branches of mathematics, mechanics and natural philosophy, mechanical drawing, French, English, etc., but its salient features will be the acquisition of a practical acquaintance with the materials of which steam engines are manufactured, the mode of putting them together and taking them to pieces, of operating locomotives, practice in handling locomotives of peculiar pattern, and instruction in the rules governing the running of trains. A period of training in railroad shops in foundries and mills will also enter into the curriculum. After satisfactory examination in the branches named pupils will be given a certificate of fitness.—*Two Republics (Mexico).*

Roads Closed by Foreclosure in 1890.

ROAD.	Miles.	Funded debt.	Capital stock.
Ft. Mad. & Northwestern.....	45	\$229,000	\$315,000
Scioto Valley.....	131	2,267,000	2,093,000
Ind. & Ill. Southern.....	91	1,239,000	1,400,000
St. Louis, Ft. Scott & Wichita.....	293	4,777,000	6,615,000
St. Louis & Chicago (branch).....	8	100,000	100,000
Ohio, Indiana & Western.....	341	10,844,000	13,325,000
Columbia & Port Deposit.....	49	2,940,000	497,000
Kanawha & Ohio.....	129	1,154,000	12,200,000
Ohio & Northwestern.....	129	1,785,000	2,010,000
Sheff. & Birm. Coal, Iron & Ry.....	92	3,565,000	7,000,000
Tavares, Apopka & Gulf.....	29	3,350,000	680,000
Oregonian Ry.....	152	1,000,000	960,000
Oakland & State Line.....	17	34,000	34,000
Columbus & Mansfield.....	19	200,000	850,000
Cleve. St. Louis & Kansas City.....	10	500,000	210,000
Jacksonville Southeastern.....	128	1,667,000	1,000,000
American Midland.....	23	460,000	160,000
Houston, East & West Texas.....	192	2,094,000	1,920,000
Shreveport & Houston.....	46	400,000	400,000
Peach Bottom.....	20	200,000	200,000
St. Louis, Cable & Western.....	16	600,000	1,000,000
Harrisburg & Potomac.....	38	507,000	331,000
Chicago & Atlantic.....	247	9,798,000	9,563,000
Danville & New River.....	75	700,000	368,000
Shenandoah Valley.....	255	9,476,000	3,696,000
St. Louis, Arkansas & Texas.....	1,222	34,784,000	23,083,000
Savannah, Griffin & North Ala.....	60	500,000	1,014,000
Frankfort & Holmesburg.....	4	50,000	100,000
Bennington & Glastonbury.....	9	150,000
Total 29 roads.....	3,825	\$90,851,000	\$91,651,000
Total debt and stock.....	182,495,000

(Narrow gauge.)

ROADS PLACED IN RECEIVERS' HANDS IN 1890.

ROAD.	Miles.	Funded debt.	Capital stock.
Jacksonville & Southeastern.....	128	\$1,667,000	\$1,000,000
Shreveport & Houston.....	46	400,000	400,000
East Line and Red River.....	124	861,000	615,000
Mobile & Girard.....	85	1,030,000	1,277,000
Florida Southern.....	307	3,000,000	2,595,000
Kansas City, Wyandotte & N. W.....	239	4,400,000	2,773,000
Trinity and Sabine.....	86	1,340,000
New Orleans and Gulf.....	68	1,000,000	241,000
Toledo & South Haven.....	37	216,000	250,000
San Antonio & Aransas Pass.....	500	11,445,000	5,000,000
Chautauqua Lake.....	23	513,000	663,000
Green Bay, Winona & St. Paul.....	216	4,661,000	10,000,000
South Atlantic & Ohio.....	40	1,000,000	600,000
Covington & Macon.....	107	1,284,000	1,284,000
Lackawanna & Southwestern.....	99	800,000	2,800,000
Zanesville, Mt. Vernon & Marion.....	5	300,000	300,000
St. Louis, Alton & Springfield.....	85	1,000,000	1,500,000
Oregon Pacific.....	166	4,500,000	5,000,000
Decatur Chesapeake & N. Orleans.....	34	3,000,000	3,000,000
Columbia & Puget Sound.....	34	446,000	1,000,000
Pacific Coast.....	73	1,375,000	1,270,000
Empire & Dublin.....	32	120,000	320,000
Charleston, Cincinnati & Chicago.....	175	6,567,000	6,567,000
Chesapeake & Nashville.....	35	875,000	1,050,000
Pacific Short Line.....	130	2,600,000	3,000,000
Choctawhatchee & Railway.....	61	1,600,000	1,600,000
Total 26 roads.....	2,903	\$50,865,000	\$54,142,000
Total debt and stock.....	105,637,000

*Also in list of roads sold under foreclosure.

(Narrow gauge.)

—Railway Age.

LOCOMOTIVE BUILDING.

The Illinois Central is asking bids for 50 locomotives. The Chicago, Rock Island & Pacific is asking bids for 30 locomotives.

The Chicago, Milwaukee & St. Paul will soon let contracts for 25 locomotives.

The Chicago & Western Indiana is in the market for 12 six-wheel switching engines.

The Green Bay, Winona & St. Paul is asking bids for 15 locomotives.

The Concord & Montreal has let two six wheel switching engines to the Manchester Locomotive Works.

The Michigan Central and Staten Island Rapid Transit are reported in the market for new locomotives, and also the Philadelphia & Reading for 15 and the Des Moines & Northwestern for seven engines.

The Great Western Locomotive Works, to manufacture locomotive engines and machinery, was incorporated at Springfield, Ill., recently. The capital stock is \$1,000,000. The incorporators are Alfred Skinner, Hugh R. Walker, and Thomas A. Wigham.

CAR BUILDING.

The Buffalo Car Co. has the contract for 1,000 of the cars recently ordered by the Delaware, Lackawanna & Western. The Jackson & Woodin Mfg. Co., Pa., has the other 1,000.

The Missouri, Kansas & Texas has given the order for 1,000 freight cars to the Missouri Car & Foundry Co., of St. Louis.

The St. Charles Car Co. has been awarded a contract for 17 chair cars from the Missouri, Kansas & Texas,

which are to be constructed upon an entirely new plan of interior arrangements. The first installment of this order is to be delivered in March next. The company has also under construction 10 first-class passenger and two private cars. The firm has completed and delivered within the last two weeks four passenger cars for the Kansas City, Nevada & Fort Smith, six first-class passenger cars, two chair cars and four baggage cars for the Jacksonville & Southeastern line. The interiors of the passenger cars were finished in selected San Domingo mahogany, mounted with solid bronze trimmings and lamps. The seats were of the Scarritt-Forney type, upholstered with olive plush in the coaches and old gold frieze plush in the chair cars. The saloon and toilet room walls of the latter were handsomely marbled, thus presenting an entirely new feature of finish.

BRIDGE BUILDING.

Belmont County, O.—The County Commissioners of Belmont County have advertised for three steel highway bridges over Pipe's Creek, and for the building of abutments for the same. The three bridges average 75 ft. in length. The awards will be made at St. Clairsville, O.

Bridgewater, Va.—An iron bridge is to be constructed across Dry River. It will be 200 ft. long, 16 ft. high, and have two spans with double iron pier to support it in the river. The bids for building it closed this week.

Harrisonburg, Va.—The iron bridge to be constructed across the Shenandoah River at Island Ford, will be 400 ft. long, 12 ft. roadway and three spans of 133½ ft. each, the ends to rest on stone abutments and supported in the river by iron piers.

Wheeling, W. Va.—The first of the two bridges which the Wheeling Bridge Co. is building over the Ohio River at Wheeling was completed last week. It is a steel highway bridge extending from Wheeling Island to the Ohio shore, and was erected by Baird Bros., of Pittsburgh, Pa. It consists of four spans over water and a viaduct 400 ft. long over the tracks of the Cleveland & Pittsburgh and Cleveland, Lorain & Wheeling roads. Just a few hours after the last river span was secured and the beams and braces bolted, the false work supporting it was carried away, but the span was not damaged. The work on the main channel bridge has been suspended on account of the severe weather and high water.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In New York the Supreme Court rules that a state statute authorizing a company to operate a railroad through the streets of a city, and to use "the power of horses, animals, or any mechanical or other power, or the combination of them," embraces electricity as a motive power.

In Missouri the Supreme Court holds that a local tax levied only on property within the limits of a particular township to pay township funding bonds is not a "county tax" within the meaning of defendant's charter, which exempts it "from state and county taxes."

In the Federal Court a mortgage provided that certain bonds secured by it remaining in the hands of the trustee should not be issued unless with the assent of a majority in amount of the outstanding preferred stock; and that, if any part of such bonds should be used for the purpose of constructing branches or extensions, the same should only be countersigned and delivered by the trustee at a rate not exceeding \$20,000 per mile of new construction, and upon the certificate of the engineer of the mortgagee that sections of not less than 10 miles had been completed, ready for operation. In a suit to compel the trustee to countersign and deliver the bonds, the court holds, that the mortgage did not authorize the trustee to refuse to issue them except for continuous sections of 10 miles each, but that the company was entitled to them for every 10 miles of new construction completed and ready for operation, whether in branches, each shorter than 10 miles, or in the excess over 10-mile sections.

In Wisconsin in 1874 the state granted lands to a railroad company, to aid in the construction of its road, on condition that it should construct 20 miles each year until the road should be completed, patents for a certain amount of the land to be issued to the company on completion of each 20 miles. Laws Wis. 1879, c. 22, provided that all of such lands theretofore patented, or which might thereafter be patented, under the law of 1874, should be exempted from taxation of all kinds for 10 years. The Supreme Court holds that the period of exemption did not begin to run as to each batch of land thereafter patented from the date of the patent, and continue 10 years therefrom, but began to run at once as to all the land granted, and ceased entirely, as to all, at the end of 10 years.

In Alabama the Supreme Court rules that the power of a railroad company to acquire land in aid of the construction of its road will not pass to a consolidated corporation of which it forms a part, unless its line, when completed according to its charter, will form a continuous track with those of the other constituents of the consolidated corporation, so as to admit of the passage of trains without break or interruption.

The Supreme Court of Indiana holds that under the state statute allowing a penalty of one dollar a day after demand by an employer for wages due, no penalty can be recovered that had not accrued at the commencement of suit.

Injuries to Passengers, Employees and Strangers.

In Missouri a passenger aged 67, and in good health, was directed to get off defendant's train, a freight carrying passengers, before reaching his station. His duties requiring haste, he started on beside the train, the road-bed being closely fenced with barbed wire, but soon came to a bridge, to cross which he had to mount a flat-car, as did also another passenger. Reaching the front of the car, and being anxious lest the train might start, he, having first examined the ground, jumped from the coupling outward, with one hand on the car in front, and on landing broke his leg. The Supreme Court holds the railroad liable.

In Virginia the Court of Appeals rules that when a railroad stops its car over an excavation made by the city, to allow passengers to alight, and neither warns them of the danger nor assists them to alight, it is liable for injuries sustained by a passenger who steps off the car into the excavation.

In Minnesota the plaintiff was injured while a passenger on a mixed way freight and passenger accommodation train. The train parted and the rear part ran into the front part, which had stopped at a water-tank, the

engineer being unaware of the break, there being no bell rope on the train. The evidence showed that the train carried way-freight cars, which were taken on and left at different stations. There was evidence that bell-ropes are used on through freight or mixed accommodation trains; but defendant's employees testified that they had never known of a rope being used on a way freight or mixed train; that they had tried to use a rope on such a train and had found it impracticable. The Supreme Court holds that there was no evidence that defendant was negligent in not having a bell rope on the train.⁹

In New York the Supreme Court rules that the fact that a panel of a stove in a railroad station falls from its place while an employe is raking the fire is sufficient evidence of negligence on the part of the company to go to the jury, in an action by a passenger injured thereby, and to sustain a verdict in his favor.¹⁰

In Utah the Supreme Court rules that the duties of a conductor of a freight train being somewhat general, one who has been conductor seven years, and brakeman for several years previously, is authorized, when his train is late, and the brakemen have made unsuccessful attempts to couple a car, to try to couple it himself.¹¹

In Texas the plaintiff in attempting to uncouple cars found the coupling-pin fastened, when he signaled to the engineer to stop the train, which was done. Being still unable to remove the pin, he asked the engineer to give him the slack. The train kept moving slightly, and, after moving along with it 10 or 12 ft., plaintiff succeeded in pulling out the pin, and, as he stepped out, the leg of his pants was caught by a "sliver" in the rail, causing a car-wheel to run over his foot. The Supreme Court holds that a verdict for plaintiff would not be set aside because of his negligence in stepping between moving cars.¹²

In Ohio the Supreme Court rules that one who causes a ditch six feet deep, and two and a half feet wide, to be dug across the traveled portion of a highway, the probable effect of which is to injure third persons, is not relieved from liability for injuries thence arising, because he has let the work to a contractor over whom he has no control in the mode of doing it.¹³

In Minnesota, the Supreme Court holds that in an action against a railroad for the death of a child who was crushed against a turn-table that was pushed aside from its proper position, while the child was playing about it, it is a question for the jury whether defendant had exercised the requisite degree of care in securing such turn-table, though it may have been fastened in the manner usual with railroad companies.¹⁴

In Utah the Supreme Court rules that it was not necessary that a freight conductor, killed by catching his foot in an open frog while making a coupling, should have given the company notice of the danger from open frogs, nor did he assume the risk of danger therefrom by continuing in his employment after knowing that a safety block would remove its perils. Risks of employment do not include risks arising from neglect to use safety blocks in frogs, on the employer's railroad track; that being a reasonable means to prevent injury to employes making couplings.¹⁵

In Pennsylvania the Supreme Court rules that in an action by an engineer against a railroad company for personal injury caused by the overturning of his engine, where the only evidence of defendant's negligence is that the rail was somewhat worn at the place where the accident occurred, and it appears that the rail was examined and repaired by plaintiff's fellow-servants two weeks before the accident, the court should order a judgment for the railroad.¹⁶

In Utah the Supreme Court holds that a verdict for a brakeman who was injured in a wreck caused by a broken car wheel will not be disturbed where the evidence shows that there was an old crack in the wheel, which could have been seen by proper inspection.¹⁷

In Texas the Supreme Court rules that in an action for injuries caused by the derailing of plaintiff's locomotive at a defective switch, it is proper to refuse to charge that plaintiff could not recover on account of any defect in the brakes, where there is evidence that, had such brakes been in good order, the train might have been stopped before plaintiff was injured, notwithstanding the defective switch.¹⁸

In New York it is held by the Court of Appeals that the statutory provision that railroad companies shall fence their tracks, and be liable for injuries to live stock upon failure to do so, is for the protection of persons on the trains as well as animals on the track, and a railroad company is liable to a brakeman injured through a collision of his train with a horse that had come upon the track through a defect in the fence.¹⁹

Schuylkill Valley Navigation & Railroad Co., 2½ per cent., payable Jan. 15.

Terre Haute & Indianapolis, 3 per cent., payable in February.

Wheeling & Lake Erie, 1 per cent., quarterly, on the preferred stock, payable Feb. 16.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Albemarle & Pamlico, annual, Norfolk, Va., Jan. 20.

Allegheny & Kinzua, annual, Olean, N. Y., Feb. 10.

Arkansas & Louisiana, annual, Washington, Hempstead County, Ark., Jan. 28.

Camden & Atlantic, annual, Cooper Point, Camden, N. J., Feb. 26.

Chicago Belt, special, Chicago, Ill., Feb. 24, for the purpose of making a new lease with the Chicago & Western Indiana.

Chicago & Western Indiana, special, Chicago, Ill., Feb. 24, to consider proposed improvements.

Dallas & Greenville, annual, Dallas, Tex., Jan. 20.

Dallas & Waco, annual, Dallas, Tex., Jan. 20.

Dallas & Wichita, annual, Dallas, Tex., Jan. 20.

Lehigh Valley, annual, 228 South Third Street, Philadelphia, Jan. 20.

New York, Ontario & Western, annual, 18 Exchange place, New York City, Jan. 21.

Ontario, Carbondale & Western, annual, Scranton, Pa., Jan. 28.

Pittsburgh & Lake Erie, annual, 77 Fourth avenue, Pittsburgh, Pa., Jan. 27.

Pittsburgh, McKeesport & Youghiogheny, annual, Pittsburgh, Pa., Jan. 27.

St. Catharines & Niagara Central, annual, St. Catharines, Ont., Jan. 26.

Western & Atlantic, annual, Atlanta, Ga., Jan. 21.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1122 Jirard street, Philadelphia, on the first and third Saturday, of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m., on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the Southwest* generally holds its meetings at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers, Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

Engineering Association of the South.

A regular meeting of the Engineering Association of the South (formerly the Engineering Association of the Southwest) was held at the Y. M. C. A. building, Nashville, Tenn., on Thursday, Jan. 8, at 8 o'clock p. m. Papers on "Measurements of the Discharge of the Tennessee and Cumberland Rivers," by Mr. C. A. Turrell, Nashville, Tenn., and on "A Study of Steam Engine Pistons," by Prof. Wm. T. Magruder, Nashville, Tenn., were read.

Illinois Society Engineers and Surveyors.

The sixth annual meeting of the Illinois Society of Engineers and Surveyors will be held in Springfield, Ill., Jan. 28-30.

The Western Railway Club.

This club will hold its next meeting on Jan. 20, at 2 p. m., Rookery Building, Chicago. Subjects for discussion: 1. "Vertical Plane Couplers and Automatic Air Brakes." The paper upon this subject read at the December meeting by D. L. Barnes will be discussed. 2. "Counterbalancing Locomotives." Mr. J. N. Barr, of the Chicago, Milwaukee & St. Paul, will present a paper upon this subject. All interested are cordially invited to attend.

PERSONAL.

—Mr. L. L. Falt, the General Superintendent of the Mersey tunnel (Liverpool), is dead. He had been superintendent since the opening of the tunnel in 1886.

—Mr. D. C. Prescott, Assistant General Freight Agent of the Boston & Maine, has been appointed General Freight Agent of the Concord & Montreal.

—Mr. Henry F. Sampson has been elected Superintendent of the Connecticut River road to succeed James Mulligan, who was recently elected President. Mr. Sampson has been a conductor on the Boston & Albany for very many years.

—Hon. C. S. Stanhope, who became Vice-President of the Mexican National shortly after the resignation of General Manager J. F. O'Brien, has resigned that position, but will continue as government representative of the company.

—Mr. W. W. Fagan, General Superintendent of the Kansas City, Fort Scott & Memphis, is reported to have resigned, and, it is said, has been offered a Superintendency on the St. Louis, Iron Mountain & Southern and the Little Rock & Fort Smith road.

—Col. J. M. Eddy, General Manager and one of the Receivers of the International & Great Northern road, died in Pasadena, Cal., this week of hemorrhage of the lungs. Colonel Eddy arrived there Dec. 17 for the benefit of his health. He had been ill for nearly a year.

—Mr. Thomas Thompson, who succeeds Mr. Atley Peterson as Railroad Commissioner of Wisconsin, is a native of Sweden, where he was born Nov. 7, 1851. He has been a resident of Wisconsin since his sixth year. Mr. Thompson has been engaged in mercantile business.

—Mr. John T. Rich, Railroad Commissioner of Michigan, will probably vacate that office shortly, as his term has expired and another name having been sent to the State Senate by the Governor. Mr. Rich's administration has been one of excellent judgment, and quite free from the demagoguery which has weakened the authority of so many of the State Commissioners.

—Maj. James W. Wilson has tendered his resignation as Superintendent of the Knoxville, Cumberland Gap & Louisville road. Mr. J. B. Taylor, late Auditor of the company, has been appointed his successor. Major Wilson was Chief Engineer of the company, and had charge of the construction of the road, and when it was finished in August, 1889, he became its Superintendent.

ELECTIONS AND APPOINTMENTS.

Addison & Pennsylvania.—The following officers were elected at the annual meeting of the road, held Jan. 12, Thomas C. Platt, 49 Broadway, New York, President; William Brookfield, Vice-President; J. E. Jones, Secretary; F. R. Winne, Treasurer; and F. M. Baker, Addison, N. Y., General Superintendent.

Alabama Great Southern.—James McCarty has been appointed Superintendent of this road, vice A. Griggs, transferred.

Baltimore & Cumberland Valley.—An election for directors of the road was held in Chambersburg, Pa., Jan. 9. Among the directors elected were George B. Cole and John McPherson, of Shippensburg.

Baltimore & Harrisburg (Western extension).—At a meeting of the stockholders of this division of the Western Maryland this week Hon. David Wills of Gettysburg, Pa., was elected President; George H. Baer of Baltimore, Treasurer; William F. Quimby, Secretary, and the following Board of Directors: Andrew Marshall, William F. Benchhoof, A. C. Musselman, C. H. Buchler, J. Emory Bair and John A. Lussell.

Barclay.—The officers of this road, which is now operated independently, are as follows: Edwards Hoopes, President, Philadelphia, Pa.; J. Raymond Claghorn, Vice-President, Secretary and Treasurer, Philadelphia, Pa.; E. O. MacFarlane, Superintendent, Towanda, Pa.

Boston & Maine.—S. T. Donovan, for several years connected with the General Freight Department of the Boston & Lowell and later in the Boston office of the Canadian Pacific Department, has been appointed Assistant General Freight Agent to succeed D. C. Prescott.

Cape Breton Extension.—A meeting of the stockholders of the company was held at the company's office, No. 55 Broadway, New York, Jan. 13, at which the following directors were elected: L. M. Shute, James J. White, J. T. Rice, George A. Taylor, Henry Alton; at a meeting of the directors the following officers were elected: J. T. Rice, President; George A. Taylor, Vice-President; Henry Alton, Secretary and Treasurer; L. M. Shute, General Manager; G. W. Lockwood, Attorney.

Carrabelle, Tallahassee & Georgia.—The company has been incorporated in Florida by the following Directors: William Keating Clare, of New York; Jesse T. Bernard and Leroy D. Ball, of Tallahassee, Fla.; John C. Hodge, of Sopchoppy, Fla., and Oliver H. Kelly, of Carrabelle, Fla. The following officers were elected: Leroy D. Ball, President; Jesse T. Bernard, Vice-President; A. Orr Symington, General Manager; W. C. Powell, Secretary and Treasurer; J. B. C. Drew, General Counsel. The principal office will be in Tallahassee, Fla.

Charleston, Cincinnati & Chicago.—This road is now operated by Samuel Lord, as Receiver, with office at Charleston, S. C. John F. Jones, previously Superintendent, has been appointed General Manager, with office at Blacksburg, S. C.

Chicago & Erie.—C. L. Thomas, Assistant General Freight Agent (Phenix Building, Chicago), will have immediate charge of the freight traffic on the line. The jurisdiction of Mr. H. W. Forward, Division Freight Agent, will be extended to cover the line Chicago to Marion inclusive. The office of the Division Freight Agent has been removed from Huntington, Ind., to the Phenix Building, Chicago.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Denver & Rio Grande, 2½ per cent. on the preferred stock, payable Feb. 16.

Evansville & Terre Haute, quarterly, 1½ per cent., payable Jan. 22.

Great Northern, quarterly, 1 per cent. on the preferred stock, payable Feb. 2.

Little Schuylkill Railway & Navigation, 3½ per cent., payable Jan. 12.

Louisville & Nashville, 2½ per cent., payable Feb. 5.

Mill Creek & Minehill Navigation and Railroad Co., 5 per cent., payable Jan. 15.

Mine Hill & Schuylkill Haven, 3 per cent., payable Jan. 15.

Mount Carbon & Port Carbon, 6 per cent., payable Jan. 15.

Rome, Watertown & Ogdensburg, 3 per cent., payable Feb. 16.

¹ Hudson River Tel. Co. v. Watervliet Turnpike & R. Co., 9 N. Y. Supp., 177.

² State v. Hannibal & St. J. R. Co., 13 S. W., Rep., 505. But a road tax is held a county tax in another case in the same court.—State v. H. & St. J. R. Co., 13 S. W., Rep., 406.

³ D. & R. G. R. Co. v. U. S. Trust Co., 41 Fed. Rep., 720.

⁴ State v. Harshaw, 45 N. W. Rep., 306.

⁵ Geo. Pac. R. Co. v. Sames, 7 South. Rep., 382.

⁶ Terre Haute & I. R. Co. v. Baker (Ind.), 24 N. E., 83.

⁷ Adams v. Mo. Pac. R. Co., 13 S. W. Rep., 539.

⁸ Richmond City R. Co. v. Scott, 11 S. E. Rep., 404.

⁹ Oviatt v. Dakota Cent. R. Co., 45 N. W. Rep., 430.

¹⁰ Wilson v. Brooklyn El. R. Co., 9 N. Y. (Supp.), 277.

¹¹ Seley v. Southern Pac. Ry. Co., 23 Pac. Rep., 751.

¹² Texas & P. Ry. Co. v. Overheiser, 13 S. W. Rep., 468.

¹³ Ohio South. R. Co. v. Morey, 24 N. E. Rep., 269.

¹⁴ O'Malley v. St. Paul, M. & N. Ry. Co., 45 N. W. Rep., 440.

¹⁵ Seley v. Southern Pac. Ry. Co., 23 Pac. Rep., 751.

¹⁶ Bunel v. Lowen, 19 Atl. Rep., 678.

¹⁷ Daniels v. Union Pac. Ry. Co., 23 Pac. Rep., 762.

¹⁸ Texas & P. Ry. Co. v. Johnson, 13 S. W. Rep., 463.

¹⁹ Donegan v. Erhardt, 23 N. E. Rep., 1,051.

Chicago & Northwestern.—A. E. Hill has been appointed Passenger Agent for New York City and vicinity, vice E. D. Harrington, resigned.

Chicago, St. Paul & Kansas City.—W. A. Beckler has been appointed Southern Passenger Agent of this company, with headquarters at 188 Clark street, Chicago, vice Geo. W. Andrews, resigned. His territory will embrace Indiana, Illinois, Kentucky, Tennessee, Mississippi, Alabama, Georgia, Florida, North Carolina and South Carolina.

Chicago, Wabash & Paducah.—The following are the incorporators of this company: Joseph P. M. Howard, Edward Austin, Erastus N. Rinehart, Effingham; James M. Tanner, Edward Hawkins, Louisville; Randolph Smith, Flora; John H. Wilson, Samuel J. Pake, William Hamil, McLeansborough; John W. Mitchell, R. S. Marsh, Harrisburg, Ill.; William M. Johnson, M. J. Jones, Johnsonville.

Choctaw Coal & Railway Co.—The receivership was settled this week, Edwin D. Chadick and Francis I. Gowen being appointed receivers.

Cincinnati, New Orleans & Texas Pacific.—A. Griggs has been appointed Superintendent of this road, with office at Somerset, Ky., vice H. F. Clark, assigned to other duties.

Cleveland, St. Louis & Kansas City.—The following are now the officers of this road, which is operated by the American Construction Co.: J. H. Bethune, President, St. Louis; J. E. Risley, Vice-President, New York; J. W. Craney, Treasurer; A. C. Crane, Secretary; C. Hamilton, Chief Engineer and Superintendent, St. Louis, Mo.

Columbus, Hocking Valley & Toledo.—At the annual meeting of the company held in Columbus, O., Jan. 13, Charles Foster of Fostoria, O., P. W. Huntington and James Kilbourne of Columbus were re-elected to the Directors to serve for three years. The Directors holding over are: One year—Charles B. Alexander, New York; George W. McCook, Steubenville; C. C. Waite, Columbus. Two years—Samuel D. Davis, Thomas F. Ryan and C. B. Van Nost—advised, New York.

Cooperstown & Charlotte Valley.—The following directors have been elected: Dr. Horace Lathrop, President; Albert Lane, Sands Shumway, William M. Michaels, Thomas W. Thayer, Samuel Hecox, Lancelot Taylor, Peter Parshall, Adriel Murphy, Allen Gallup, Orvin Benton, John Wood, S. J. W. Reynolds, all of Otsego County, N. Y.

Cornwall.—The following directors have been elected: President, William C. Freeman; Secretary, J. P. Jackson; Treasurer, D. S. Hammond; Directors, William C. Freeman, E. C. Freeman, R. P. Alden, D. S. Hammond, and J. P. Jackson.

Cornwall & Lebanon.—The officers elected at the annual meeting this week were: President, Robert H. Coleman; Directors, John Meily, Grant Wiedman, A. Hess, J. H. Redsecker, Charles W. Few, C. Shenk, and George D. Rise.

Delaware, Lackawanna & Western.—H. C. Hicks has been appointed Assistant General Freight Agent of this company.

Delaware, Susquehanna & Schuylkill.—The officers are: Eckley B. Cox, President; Arthur McClelland, Secretary; J. Brinton White, Treasurer; Edgar Kudlich, Chief Engineer; all of Drifton, Pa. E. B. Ely, 120 Broadway, New York, is General Agent.

Des Moines & Northwestern.—Geo. W. Ogilvie, Superintendent and Purchasing Agent, has resigned from that position, and F. C. Hubbell will perform the duties connected with that office.

Diamond Valley.—H. H. Bechtel has been appointed Vice-President, with office at Newport, Pa. R. W. Cline has been appointed General Superintendent of Transportation with office at Harrisburg, Pa. The offices of First and Second Vice-Presidents have been abolished.

Erie & Pittsburgh.—The stockholders of the company held their annual meeting in Erie, Pa., Jan. 12, and elected William L. Scott, M. H. Taylor, Charles H. Strong, William Brewster and Joseph McCarter, of Erie; Geo. B. Roberts, of Philadelphia, and Charles S. Fairchild, of New York, directors. William L. Scott was re-elected President and William Brewster, Treasurer and Secretary.

Florida Midland.—G. F. Parker has been appointed Assistant General Freight and Passenger Agent, vice G. H. Hepburn, resigned.

Grand Trunk.—The company announces the appointment of J. J. Cunningham as Assistant General Freight Agent, A. H. Harris District General Freight Agent at Hamilton, and Charles J. Haigh as Through Traffic Agent in Detroit. Mr. Harris has been Division Freight Agent at Detroit and succeeds R. Quinn, appointed European Traffic Agent.

Intercolonial.—T. D. Laurie has been appointed Superintendent of the Cape Breton division.

Iowa Railroad Commission.—The Board of Railroad Commissioners has reorganized, J. W. Luke of Franklin County succeeding Peter A. Dey, a member of the Board for two years. F. T. Campbell has been elected President, and W. W. Ainsworth re-elected Secretary.

Kansas City, Memphis & Birmingham.—Charles Keeler has been appointed Cashier and Paymaster of the road, in place of Willis L. Garey, resigned.

Lynchburg & Durham.—W. N. Mitchell, Superintendent of Transportation, is now General Superintendent of this road in charge of transportation and traffic departments, with office at Lynchburg, Va.

Newport & Sherman's Valley.—The following officers were elected at the annual meeting of the stockholders in Newport, Pa., Jan. 13: President, David Gring; Treasurer, J. H. Irwin; Secretary, Horace Beard; Directors, H. H. Bechtel, B. M. Eby, W. H. Gantt, A. N. Caldwell, W. R. Denebey, R. W. Cline, and W. A. P. Johnson.

New York, Bridgeport & Eastern.—The directors have organized anew under the same title and filed their articles of association with the Secretary of State in Connecticut. The directors are Henry R. Parrott, A. L. Winton, of Bridgeport; E. K. Lockwood, C. B. Cooledge, Norwalk; Thos. N. Brown, New York; Wm. Rotch, Boston; I. D. Mowry, Norwich; George E. Spare, B. Adams, New Haven; Geo. S. Forbush, Brookline, Mass. These officers have been elected; H. R. Parrott, President; G.

S. Forbush, Vice-President; Geo. E. Spare, Treasurer; T. N. Brown, Secretary.

Nipissing & James Bay.—The annual meeting of the shareholders was held last week and the following directors elected: W. B. McMurrich, President; Edmund Wragge, Vice President; G. M. McBean, Secretary; directors, A. Nairn, A. Desjardins, D. Girouard, Hon. F. Smith, C. I. Campbell, Wm. Hendrie.

Norwich & Worcester.—At the annual meeting of the company in Worcester, Mass., Jan. 14, George H. Ball, of Boston, was re-elected President and the following Board of Directors: Edward L. Davis, W. Bayard Cutting, New York City; Thomas R. Eaton, Worcester; Josiah H. Clarke, Worcester; Wm. A. Slater, Norwich, Conn.; George H. Ball, Boston; Francis H. Dewey, Worcester; Jeremiah Halsey, Norwich, Conn.; A. George Bullock, Worcester.

Oregon Improvement Co.—The resignations of Elijah Smith, P. W. Smith, J. H. Benedict and S. H. Thayer from the directory have been made, and W. H. Starbuck, R. Olney, F. H. Prince and M. V. B. Edgeley were elected in their stead.

Paris & Great Northern.—A meeting of the stockholders of the road was held in Paris, Tex., Jan. 10. The following board of directors was elected: Allen Manvel, H. L. Morrill, E. D. Kenna, A. Douglass, S. J. Wright, John Martin, J. C. Gibbons, B. J. Baldwin, Wm. Alexander. The directors elected the following officers: Allen Manvel, President; S. J. Wright, Vice-President; W. C. Smith, Secretary.

Philadelphia & Reading.—The annual meeting was held in Philadelphia, Jan. 12. Votes representing 787,595 shares of stock were cast, all of which were for the following officers and Board of Managers: President, A. A. McLeod; Managers, A. J. Antelo, Thomas Cochran, George de B. Keim, Henry C. Gibson, Thomas Dolan and James Boyd; Treasurer, William A. Church; Secretary, William B. Taylor.

Philadelphia & Reading Coal & Iron Co.—The annual meeting was held Jan. 12. George de B. Keim, who has been President of the company for a number of years, having declined a re-election, President A. A. McLeod, of the Philadelphia & Reading, was elected to the office. The following board of directors were elected for the ensuing year: George de B. Keim, H. A. Dupont, S. P. Wolverton, Thomas Dolan, Henry C. Gibson and W. G. Audenreid. W. A. Church was elected Treasurer and Franklin P. Kaercher, Secretary.

River Bridge.—The officers of the company are: Joseph E. Ewell, Wilbur E. Hout, Frank C. Laughlin, William B. Sirret, James H. Ross and Charles B. Mathews, of Buffalo; Thomas G. Shaughnessy, Peter A. Peterson, George M. Clark, William C. Van Horne and Isaac G. Ogden, of Montreal; Stephen S. Hout and Frederick H. James, of Lancaster, N. Y.

Savannah, Americus & Montgomery.—J. C. Wright has been appointed Engineer of Maintenance of Way, with headquarters in Americus, Ga. He will have entire charge of the roadbed, track, and bridges and buildings.

Wagner Palace Car Co.—W. H. Wood has been appointed District Superintendent at Weehawken, N. J., vice L. W. Devenbeck, transferred to be District Superintendent at Chicago, in place of W. O. Chase. G. G. Clay has been appointed District Superintendent at Grand Rapids, Mich., and G. H. Edwards at Cincinnati.

Western New York & Pennsylvania.—At the meeting of the stockholders of the company in Philadelphia, Jan. 12, the following board of directors was elected: Calvin H. Allen, Samuel G. Decoursey, Edward Owen, John D. Probst, Adolph Engler, William T. Tiers, George Bartol, E. W. Clark, Jr., Gustav E. Kissel, Isaac Seligman, Pascal R. Pratt, William Mertens and Charles M. Lea.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Augusta & West Florida.—A mortgage has been filed in the Richmond County Supreme Court for \$6,000,000 on this road. The Mercantile Trust Co., of New York, is the trustee. The mortgage is issued at the rate of \$15,000 per mile. Twenty-five miles of the road has been graded from Augusta toward Thomasville, Ga.

British Columbia.—Application will be made to the Legislative Assembly of British Columbia for act incorporating a company to construct a road, commencing at Vernon, and extending in a southerly direction to a point where the Okanagan River intersects the American boundary.

Carrabelle, Tallahassee & Georgia.—The Augusta, Tallahassee & Gulf was sold at Tallahassee, Fla., Jan. 5 to satisfy a judgment secured by W. Clark, of New York, in the United States District Court. The road was bought in by W. K. Clark and others, of New York, for \$100,000. The purchasers immediately organized the above company, and transferred the property to it. The uncompleted road will be extended from Carrabelle, Fla., to Tallahassee, Fla., and northwest to Georgia. The total length of the line is 90 miles.

Centralia & Chester.—The track is now laid to Oakdale, Ill., nine miles south of Nashville, on the Louisville & Nashville, and about 15 miles northwest of Culterville, the previous terminus. The road is to be continued from Oakdale and Nashville northeast to Centralia, on the Illinois Central, a distance of about 18 miles.

Chicago, Wabash & Paducah.—The company has been incorporated in Illinois. It is proposed to construct a road from Effingham, Ill., to Paducah, Ky. The capital stock is \$2,000,000 first preferred stock and \$1,000,000 common stock; \$3,000,000 first mortgage construction and equipment bonds may be issued.

Cincinnati, Wabash & Michigan.—Though the track has been laid for quite a time on the extension from Anderson south to Rushville, Ind., 40 miles, it has not been put in operation. Trains were expected to begin running this week, however, and also over the extension of the Evansville & Richmond.

Cornwallis Valley.—This road was formally opened last week, from Kentville, on the Windsor & Annapolis road, through Cornwallis Valley to Kingsport, N. S., a point of shipment on the basin of the Minas. The length of the line is 15 miles.

Danville & East Tennessee.—The engineering party which is engaged on the survey of the first section from Danville, Va., west, has reached a point about 15 miles

beyond the bridge of the Danville & New River narrow gauge road. They have followed the south side of the river and under Rocky Bluffs. The company has an option on the Danville & New River, and if the road is purchased it will save erecting a 600-ft. bridge over the Dan River, which it is estimated would cost \$40,000. The engineers have also located another line from Danville crossing of the Dan about a mile from Danville, and continuing on the north side some 18 miles up the river to meet an old grade made by the North Carolina Midland road a few years ago and abandoned, and which this company intends to use to Madison, N. C. The line run on the south side is intended to meet this old grade, should the line cross the Dan on the narrow gauge bridge.

Delaware, Susquehanna & Schuylkill.—The contractors have about 400 men at work on that part of the road now under construction. The main line of the road extends from Drifton southwest to Gowen, Pa., 35½ miles. This line reaches the towns of Eckley, Stockton, Hazleton, Tomhicken, and Deringer, between the terminal stations. There are branches from Stockton to Beaver Meadow, two miles, and from Hazleton to Oneida and Nelson City, 10 miles. Most of the work has been let to Brown Bros. & Co., Hazleton, Pa. The balance of the contracts will be let in the spring. The track has been laid on six miles of the road. The maximum grades are 57 ft. per mile, and the curves nine degrees. Seven iron bridges will be necessary, averaging 70 ft. each.

Emmitsburg & Gettysburg.—This company has been organized in Maryland with the intention of providing a new route between Gettysburg, Pa., and Washington, by way of the Western Maryland and the Baltimore & Ohio. The new road will at first be constructed eight miles toward Gettysburg, and connect with the Emmitsburg branch of the Western Maryland to afford another route to the Blue Ridge Mountains. J. S. Amman, of Frederick, Md., is President.

Evansville & Terre Haute.—Freight trains were recently put on the extension of the Evansville & Richmond line from Seymour northeast to Westport, Ind., and passenger trains will doubtless begin running this or next week, as the road has been well ballasted. At Westport a connection is made with the Cleveland, Cincinnati, Chicago & St. Louis. The company has trackage rights over the branch of that road north to Rushville. The Cincinnati, Wabash & Michigan, partly controlled by the above company, is now completed to that point, and has a line nearly directly north to Lake Michigan, at Michigan City.

Fairhaven & Southern.—The company will probably begin running regular trains between Fairhaven, Wash., and New Westminster, B. C., about Feb. 1, although the track between the two points has been finished for nearly two weeks. The line between Sedro and New Westminster, 73 miles, is expected to be transferred to the Great Northern before Jan. 25. The road connects near Sedro with the Seattle, Lake Shore & Eastern and trains will be run to Seattle and Tacoma over that road and the Northern Pacific.

Farmville & Powhatan.—It is proposed to build a branch of the road to extend a distance of 33 miles through Buckingham County, Va., connecting with the Norfolk & Western in Appomattox County.

Fort Wayne, Terre Haute & Southwestern.—E. P. Reynolds & Co. have the contract for building this road in Western Indiana, and they have about 100 teams at work. Their headquarters are at Carbon Hill, Ind. Eight miles of the line has been graded. This is from Carbon Hill to Mansfield. The track will be laid on this section at once and the road will then be extended to Bainbridge and to Brazil. The total projected length of the line is 200 miles from Fort Wayne to Terre Haute, but the division near Terre Haute is the only part likely to be built, for some time at least. G. O. Manchester is president and B. L. Cook, secretary and treasurer. The office is in the Rialto Building, Chicago.

Fremont, Elkhorn & Missouri Valley.—The track on the branch from Whitewood westerly to Deadwood, S. D., in the Black Hills, reached the latter town a few days ago. The branch is nine miles long and extends through a rough country and several costly tunnels were necessary. The contractors have been working on the branch for nine months. Another branch, 19 miles long, has also been built lately from Whitewood to Belle Fourche.

Grand Rapids, Chicago & St. Louis.—The proposed Lake Michigan terminus of this road has been changed from Benton Harbor to Michigan City, Ind., a port some distance south of the former place. The change that has been made is in accordance with an agreement which the promoters have made with the Louisville, New Albany & Chicago, the nature of which they decline to disclose at present. The construction of the road will give a direct line from the Brazil coal fields to Grand Rapids, Mich.

Great Northern.—It is reported that the company proposes to build a branch line from the main track of the Minnesota Eastern road into St. Louis town site, and thence across a bridge to New Duluth and thence to Duluth, Minn.

Harrisburg & Eastern.—The Sheriff of Northampton County, Pa., has sold to Henry Trumbower, of Philadelphia, the corporate franchise, rights, powers and privileges of the road. It is 107 miles in length, from a point near Harrisburg, Pa., northwesterly through Lebanon, Berks, Lehigh and Northampton counties to the Delaware River. A branch road, extending from Strausstown, Berks County, to Reading, a distance of 20 miles, is included in the purchase.

Interoceanic.—J. Livesey & Son, Chief Engineers of this line, give the following information in a report: At the last annual report the Atlantic or eastern division had been opened for traffic from the City of Mexico to Perote, 210 miles, and the Morelos line, which starts from Los Reyes, a point on the above-mentioned division 10 miles from the capital, was being operated as far as Yauatepec, 84 miles from the junction. During the past year the length of operated line has been increased by the opening of the section from Perote to Jalapa, a distance of 48 miles, and also by the 23 miles of the extension from Yauatepec to Jofutla, thus giving a total of 258 miles on the Atlantic and 107 miles on the Pacific division, or an aggregate length of 365 miles as compared with 294 miles at the same time last year. To establish through communication between the City of Mexico and Vera Cruz there only remains 83 miles between Jalapa and the sea coast, but which contains some heavy work. On this section satisfactory progress has been made. At the end of September the rails were laid for 32 miles from Vera Cruz, and for 12 miles in advance the roadbed was ready for tracklaying.

From Jalapa the grading is advancing rapidly towards Vera Cruz, but, owing to the heavier work than on the lower part of this section, no portion of the roadbed is yet ready to receive the rails. Of the earthworks and masonry between Jalapa and Vera Cruz 60 per cent. has been done, and the work on this section will be finished by the end of February, soon after which date the entire line should be open for traffic.

Louisa & Southeastern.—This company has been formed at Huntington, W. Va., for the purpose of building a line to connect the Norfolk & Western at or near Kenova, W. Va., with the Ohio & Big Sandy. The company has been regularly chartered and has elected the following officers: President, H. E. Huntington; Vice-President, Jay Northrup; Secretary, S. S. Vinson.

Matamoros & San Luis Potosi.—Work on the Cuellar concession must, by a recent modification of the contract, begin before Nov. 1, 1891, and be completed within 12 years, with the express condition that the section from Matamoros to Victoria shall be completed in the first five years and the remainder of the line in the seven years following. The subsidy is \$8,000 per kilometre, payable in six per cent. bonds of the Mexican government of special issue.

Mexican Western.—Work was begun on the road last month in the State of Jalisco, Mex. It is to connect Guadalajara with the Pacific port of Chamela. The eastern terminus will be Aguascalientes.

Michigan Central.—The project of building a branch to Sebawaing, Mich., to haul coal from the new mines there, has been abandoned for the present. A line was surveyed and the cost of building it estimated. It was then found that the coal would cost more than Ohio coal at Toledo.

Missouri, Kansas & Texas.—The extension of the Dallas & Waco division from Waxahachie south to Hillsboro, Tex., 35 miles, is now in operation. When the Dallas & Waco was organized it was projected to Hillsboro and Dallas, but it was only built as far as Waxahachie, and it has been operated as far as that point as a division of the above road for several years. The company already has a line from Hillsboro to Waco, and trains will no doubt be run to the latter point.

Montgomery, Tuscaloosa & Memphis.—Most of the sub-contractors between Montgomery and Tuscaloosa, Ala., have removed their forces and outfits to other parts of the state. Very little work is now in progress, but only a small part of the grading between the two towns remains uncompleted. Some of the contractors state that they have not received any payments in three months. An agreement is about concluded with a new construction company, the Alabama Terminal & Improvement Co., and it may have the work resumed immediately.

New Roads.—Col. H. C. Hamilton, of Dalton, Ga., Paul Trammell, of Whitfield County, and C. C. Davis, of Tunnel Hill, Ga., were granted a charter at the last session of the legislature to build a road from Dalton to Gainesville, by way of Spring Place, Ga. The incorporators say they will begin work early in the spring.

A road is to be built in the spring from the Barre road to East Barre, Vt., a distance of about 1½ miles. Ward & Douglass will probably get the contract.

Nipissing & James Bay.—The company has now purchased all the right of way from Lavase, Ont., the northern terminus of the Nipissing road, to a point in the immediate vicinity of North Bay. The Ontario government has granted the company a bonus of \$3,000 per mile for the first 50 miles, which will take the road to Lake Temagami. The length of the first section, extending from North Bay to Lake Temiscamingue, Ont., will be 80 miles.

Northern Pacific.—The track on the branch from Lakeview, Wash., south of Tacoma, to Olympia, Wash., 23 miles, was laid to the city limits of the latter town on Jan. 1, in time to secure for the contractors the \$50,000 bonus offered by the town if the road was built to its limits by Jan. 1. A high trestle and a tunnel will be built within the town limits. The station will be in the centre of the town. The tunnel will be on East Seventh street. The heaviest grades on the whole line are east of the Nesqually River. The hills on both sides of the river are steep and required a great amount of work. The iron bridge over the Nesqually could not be completed in time, and a temporary structure has been erected. The last few miles of track near Olympia was also hastily laid, and much ballasting is yet to be done. The stations between Tacoma and Olympia will be at Lakeview, Grace Park and Murray, on the American Lake, and at Woodlawn, near Olympia.

A contract has been signed for the construction of five and one-half miles of road, from a point on the Seattle, Lake Shore & Eastern to the Blue Canyon Coal Co.'s property on the southern end of Lake Whatcom, Wash.

Pecos Valley.—The company is expected to establish a regular schedule in a few days on the 90 miles of its recently completed road from Pecos, Tex., north along the Pecos River to Eddy, N. Mex. The road is to be extended still further north this year to Roswell, N. Mex. An extensive scheme of irrigation is planned for the land crossed by the road on its route through New Mexico. The road is owned by the firm building the irrigating canals.

Pennsboro & Auburn.—A charter for this road has been asked for in West Virginia. It is proposed to build a line from Pennsboro, Ritchie County, W. Va., to Auburn in the same county, where it will connect with the West Virginia & Pittsburgh. Some preliminary surveys have been made. M. P. Kimball is one of the projectors.

Philadelphia & Reading.—The construction of the new line to New Hope, Pa., on the Delaware River, is practically completed and will be in operation shortly. The bridge over the lake is finished and ready for the laying of the rails, and a limited number of trains will soon be running.

Richmond, Nicholasville, Irvine & Beattyville.—The company has arranged with the Southwestern Construction Co. for the completion of its line from Richmond to Irvine, Ky., work to be resumed at once. The distance between the two towns is about 60 miles, of which 30 miles has been constructed. The road is to be built from Irvine to Beattyville in the spring.

River Bridge.—This company filed articles of association with the Secretary of State at Albany, N. Y., this week. The company is formed to build a road in the village of Niagara Falls, a little over a mile in

length, beginning at the easterly end of the bridge of the River Bridge Co., which was authorized by an act of the last Legislature, thence southerly crossing the tracks terminating at Ninth street, near the tracks of the New York, Lake Erie & Western Railroad. The company has a capital of \$20,000.

Roanoke & Southern.—Despite the severe winter weather, the work of constructing this road between Roanoke, Va., and Winston, N. C., is being pushed rapidly. The engineers are running surveys from Winston to Lancaster, S. C. One survey will be by way of Salisbury through Charlotte; another by way of Lexington and Mt. Pleasant through Monroe.

Seattle & Northern.—The tracklaying will begin at once on the extension of the line to Hamilton, Wash. Judge Deady, in accordance with the petition of Receiver Simon of the Oregon Improvement Co., has granted permission to expend \$50,000 to extend the road from its present terminus to Hamilton, about seven miles.

Shuswap & Okanagan.—This company is applying to the Dominion Parliament for an amendment to its act of incorporation authorizing the extension of the line from a point near the present terminus to a point on the Intercolonial boundary at or near Osoyoos Lake; also for power to lease its road to the Canadian Pacific for 25 years.

South Bound.—Moore & Springs, of Columbia, S. C., have the contract for grading the road from Graham, near Blackville, to Columbia, a distance of about 47 miles; also contract for eight miles on the same road at Campbellton, S. C.

Toronto Railway Viaduct & Tunnel.—This company is applying to the Dominion Parliament for incorporation with power to construct an elevated road and tunnels and viaducts along and under the streets of the Esplanade in the city of Toronto, from a point at or near the village of Mimico easterly to some point in the township of York or Scarborough.

Utica Belt Line.—W. E. Winner, of Kansas City, Mo., and others who have become interested in this project claim that they will soon have a large part of the line under construction. It is to be a steam line, about 20 miles long. It is proposed to use the tracks of the New York Central & Hudson River road for a few miles, as a connecting link between its two ends. It will encircle the city and connect all the manufacturing towns in the outskirts. It will extend through the suburban towns of New Hartford, New York Mills and Whitesborough, all important manufacturing centres. Its cost is estimated at \$1,000,000.

Wadena & Park Rapids.—The company has filed a mortgage in the office of the Secretary of State in favor of the Minneapolis Trust Co. for \$540,000 on the 36 miles of its road from Wadena to Park Rapids, Minn.

Western Counties.—The extension of this road, built by the Canadian Government to complete a line along the shore of Nova Scotia from Halifax to Yarmouth, will be opened for traffic about Jan. 22. The line extends from Digby to Annapolis, a distance of about 21 miles.

West Virginia & Pittsburgh.—The contracts were let last week at Parkersburg, W. Va., for the extension of the line from Flat Woods, Braxton County, W. Va., to the mouth of Laurel Creek in the same county, a distance of 20 miles along Elk River. The first eight miles was awarded to Steers & Neeley, and the remainder to Joseph Foucey. The contract for building a bridge over Elk River was let to F. H. Blodgett.

White River.—The grading and all construction work has been recently suspended on this Washington road. The company was organized recently at Buckley, Wash., but only \$12,000 of the capital stock was subscribed, and it was difficult to collect even that. There has been completed about one mile of grade through the level country east from Buckley, that distance being as far as the line is definitely located. The engineers have run preliminary surveys about seven miles east from Buckley. The first three miles is through very easy country, the remainder being more or less difficult, some of it extremely so. It is not probable that there will ever be more than three or four miles built by the present company; which would reach a good belt of timber. It would then be operated as a narrow gauge logging road.

GENERAL RAILROAD NEWS.

Louisville & Nashville.—The statement of earnings for November and the five months gives the following figures:

	1890.	1889.	Inc. or dec.
Gross earn.....	\$1,675,766	\$1,593,416	I. \$82,350
Oper. expen.....	1,061,952	839,441	I. 122,511
Net earn.....	\$613,814	\$653,975	D. \$42,161
July 1 to Nov. 30:			
Gross earn.....	\$8,382,536	\$8,065,104	I. \$317,432
Oper. expen.....	5,214,776	4,690,589	I. 524,187
Net earn.....	\$3,167,760	\$3,404,515	D. \$236,755

Marietta & North Georgia.—An application was made in the United States District Court at Atlanta, Ga., Jan. 13 for the appointment of a Receiver of the road, and an order was passed for the company to show cause why such Receiver should not be appointed.

Milwaukee, Lake Shore & Western.—At a meeting of the board of directors of the company, Jan. 13, a dividend of 3½ per cent., making 7 per cent. for the year, upon the preferred stock, and an annual dividend of 7 per cent. upon the common stock, was declared. The following figures (December estimated) give the earnings for 1890: Gross receipts, \$3,800,000; operating expenses and taxes, \$2,418,000; net receipts, \$1,442,000; interest and rentals, \$741,000; surplus for the year, \$701,000. The amount required for dividends is \$506,280, leaving a balance of \$194,711.

New York, New Haven & Hartford.—At a meeting of the Board of Directors held in New York last week, the officers of the company were directed to give notice that the capital stock of the company would be increased on Oct. 1 next by the issue of 46,750 shares of new stock at par to the stockholders of record on March 31. This is one share of new for four shares of old held by them on that day. The stockholders are to have the month of April in which to subscribe for this new stock. They are to pay for it \$50 a share on July 1, and \$50 a share on Oct. 1. The stock will not participate in any dividends payable to Jan. 1, 1892, and meanwhile will have no voting privileges. It is understood that the future dividends of the company will depend upon

the amount of net earnings from time to time. The present stock of the company is \$18,700,000, and this issue will increase it to \$23,375,000. The issue is made for the purpose of paying for work already done, and for prosecuting the improvements now going on at various points on the road.

Northern Pacific.—The earnings for November and the 11 months are shown in the following table:

NORTHERN PACIFIC.			
	1890.	1889.	Inc. or dec.
November.....	\$2,593,311	\$2,226,731	Inc. \$376,580
Gross earnings.....	1,246,186	1,006,090	Inc. 240,186
Net earnings.....	\$22,121,472	\$20,140,516	Inc. \$1,980,956
Jan. 1 to Nov. 30:			
Gross earnings.....	9,990,476	8,674,231	Inc. 1,316,245
Net earnings.....			

Pennsylvania.—The earnings of the lines east of Erie and Pittsburgh, for November and the 11 months to Nov. 30, were as follows:

WISCONSIN CENTRAL.			
	1890.	1889.	Inc. or dec.
November.....	\$457,745	\$419,636	Inc. \$38,109
Gross earnings.....	157,429	191,928	Dec. 34,499
Net earnings.....	\$1,838,445	\$3,912,518	Inc. \$2,074,073
Jan. 1 to Nov. 30:			
Gross earnings.....	1,793,032	1,447,327	Inc. 345,705
Net earnings.....			

On the Western lines for the month of November the net earnings increased \$75,655. For the 11 months net earnings increased \$1,415,946.

Philadelphia & Reading.—The annual report gives a statement of the operations of the Railroad and Coal & Iron Co. which shows the gross earnings of the railroad company for the year ending Nov. 30, 1890, to have been \$22,106,450 (including that of canals, steam colliers, coal barges, real estate and income from investment); working expenses, \$13,901,137; rentals of leased roads and canals, \$2,830,743; interest, \$4,351,311; showing a profit of \$1,083,207. There is a loss of \$130,004 as compared with the year ending Nov. 30, 1889. The gross earnings of the Coal & Iron Co. were \$18,929,773; working expenses, \$19,080,984; interest, \$822,126, showing a loss of \$873,284, an increased loss as compared with last year of \$1,088. The total profit of the two companies for the year ended Nov. 30, 1890, was \$100,022, a decrease of \$128,916 as compared with last year. A recapitulation of the figures is given in the report as follows: Gross receipts, \$23,931,487; gross expenses, \$11,941,581; earnings from traffic, \$8,992,905; profit from other sources, \$511,158; total, \$9,504,063. Expenses were: \$2,830,743; interest account, \$4,351,311; debtor balance profit and loss, taxes, etc., \$311,639; total, \$7,493,686, leaving a balance of \$2,040,378. Less interest and sinking funds of divisional mortgages of the Coal & Iron Co., guaranteed by the railroad company: Interest, \$782,435; sinking funds, \$340,107, total, \$1,122,542, leaving a surplus over the fixed charges of both companies of \$917,836, total, \$957,171. Judgments and other accounts reduce this amount by leaving a deficit in the receipts and expenditures (and including the profit and loss balance account), of both companies of \$39,335. The report says: The increase in profit from the operations of the railroad over the previous year was \$664,044. There was an increase in the interest charges of \$266,172; in taxes of \$41,763, and in equipment dismantled \$100,426. There was paid during the year for taxes prior to 1890, which had been in dispute with the commonwealth of Pennsylvania, \$74,065. There were also extraordinary payments required to be made amounting to a large sum included in the foregoing deductions from income. These expenditures have more than consumed the increase in profit above referred to. The report says the decrease in rates during the year on coal averaged .006 cent. per ton per mile, and on merchandise traffic .054 cent. It was decided not to pay any interest on the preference income bonds.

Philadelphia, Wilmington & Baltimore.—The annual report shows that the earnings of all the lines for the year ending Oct. 31, 1890, were \$3,823,777; operating expenses, \$5,250,174, and net earnings, \$1,570,212. This is an increase in net earnings of \$33,975.

St. Louis & Southwestern.—The charter of this company was filed in Texas this week. It is the new title to be borne by the reorganized St. Louis, Arkansas & Texas, when that road has been released from the control of the courts.

St. Louis, Alton & Terre Haute.—The Executive Committee has issued a circular to stockholders announcing that the transfer of the main line of the Cairo, Vincennes & Chicago Company has been consummated; also the sale of \$10,000,000 of Cairo, Vincennes & Chicago bonds to the Cleveland, Cincinnati, Chicago & St. Louis for \$10,000,000 of collateral trust 100-year four per cent. gold bonds. The further amount of \$7,000,000 of these bonds has been deposited with the United States Trust Co. to secure the payment of principal and interest of the road's first, second preferred and second income bonds. The company has received \$2,700,000 of Big Four collateral trust bonds, and announces that any time prior to Jan. 31 it will receive the surrender of any of its preferred stock, and will pay therefor about March 1 collateral trust bonds of Cleveland, Cincinnati, Chicago & St. Louis at the rate of 150 per cent. of the par amount of such stock in said bonds. Transfer books close Jan. 3.

Sedalia, Warsaw & Southern.—This road, a narrow-gauge line extending from Sedalia 40 miles south to Warsaw, Mo., was sold at sheriff's sale at Sedalia Jan. 10 for \$500,000 to George C. Smith and L. G. McNair, of St. Louis, trustees for the bondholders. Last October, in the Pettis County Court, Carlos S. Greeley and the Missouri Pacific were awarded judgments of \$149,380 and \$301,480 respectively against the company. The sale was to satisfy these judgments.

Southern Vermont.—The Governor and Council of Massachusetts this week sold to the Fitchburg Railroad the Southern Vermont line for \$175,000, in four per cent. coupon bonds, expiring June 1, 1920. The line is six miles long and is part of the Fitchburg main line, but was not sold at the time the other lines were. It has always been operated by the Fitchburg and its predecessor, the Troy & Boston.

Texas Western.—Judge Don A. Pardee has filed an order reappointing S. Packard, of Houston, Tex., as receiver of this road. This is the second placing of the property in the hands of this receiver.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Jan. 14, 1891.

The Central Traffic and Western Freight associations are holding their regular monthly meetings here this week. The following are some of the more important subjects under consideration: In the Central Traffic—Percentage basis of eastbound rates; stopping freight in transit; charges for delay in loading and unloading cars; Chairman Blanchard's report in regard to irregularities and manipulations of rates; switching and drayage charges. In the Western Freight—The practice of advancing charges to shippers of agricultural implements, etc., and collecting from consignee; minimum charges on small shipments; rates upon poultry in poultry palace cars; rates on coke to Missouri river points via St. Louis, via Peoria and via Chicago; method of obtaining weights on shipments of stock cattle; rates between Eau Claire and points west of the Mississippi River; flour, St. Paul and Minneapolis to New Orleans and other Mississippi valley points; division of rates on grain from Great Northern Railway points to Chicago; reconsignment of coal at interior points.

The Western Passenger Association has authorized Chairman Finley to commence the prosecution of scalpers doing business in the state in violation of the Illinois statute, which prohibits the selling of railroad tickets by persons not holding a license from a railroad company. This action has been contemplated for some time, and its determination has carried consternation to the ranks of the brokers, who had already begun to regard the actions of Chairman Finley with considerable apprehension. It is not likely, however, that they will give up until they have exhausted all the resources which they can command.

There is a "tempest in a tea-pot" over the action of the Chicago Board of Trade in resolving hereafter to make the agents of the Chicago lines purchase a membership ticket at the regular cost of \$5,000 before they will be allowed to enter the sacred portals for the purpose of taking orders for the distribution of freight. Heretofore they have been allowed the privileges of the floor (except for trading) in order that they might be on hand with samples of corn coming in and take orders for its delivery. Another class of railroad men who have been allowed on the floor are the soliciting agents of the eastern and color lines, but they have had to pay the annual dues of a member for the privilege of soliciting. It is now proposed to make them also purchase memberships. The railroad men claim that their presence was of benefit to the traders by enabling them to give orders on the spot for the movement of the cars, and they have agreed to refuse to purchase the memberships.

The Rock Island has become tired of being imposed upon by bogus city firemen and policemen in Chicago, and hereafter will pass none except those in full uniform, unless they are provided with a season pass. These passes are to be furnished all bona fide officers and firemen upon request of the departments.

It appears that the cutting of passenger rates between Chicago and St. Louis, started by the opening of the Atchison's new line, has begun to affect southbound business, as Chairman Finley has authorized a reduction of the rates from Chicago to St. Louis to \$6.50.

The advance in westbound freight rates from the Atlantic seaboard to St. Paul, via the Soo line, from the basis of \$1.05 first class to \$1.30, seems to be an accomplished fact, and the Chicago jobbers express a good deal of satisfaction over the agreement. The new rates, which it is said will go into effect Feb. 1, are the same as those via the differential lines to Chicago, plus the regular rates (which are on the 60 cent basis) from Chicago to St. Paul.

Traffic Notes.

The Fitchburg road announces an increase of second-class fares from Boston to the West, to take effect Jan. 17. The increase is not back to the original rates (\$17 to Chicago), but is only to \$15.50. This indicates that the change is simply to bring the rates above those from Albany, and thus avoid violating the fourth section of the Interstate Commerce Law.

The Georgia Railroad Commission, acting under a law recently passed, is collecting information concerning freight rates on interstate traffic, the aim of the law being evidently to provide for bringing complaints concerning such rates to the notice of the Interstate Commerce Commission.

After considerable negotiation with competitors the Pennsylvania Company has decided to sell only one kind of mileage tickets, and that to be a 1,000 mile ticket to be sold for \$20 each, good over all divisions of the Pennsylvania lines west of Pittsburgh, including the Vandalia line, Cincinnati & Muskingum Valley, Grand Rapids & Indiana and Cleveland, Akron & Columbus. This will work a material reduction in fares, as hitherto the two cent per mile rate applied only to 2,000 mile tickets.

The special agent of the Interstate Commerce Commission has been collecting evidence against railroad officers, for manipulating rates, on a number of Western roads, and the grand jury at St. Paul took up the question on Wednesday of this week. Treasurer Bond and Controller Heaton, of the Chicago, St. Paul & Kansas City, and Chairman Finley, of the Western Passenger Association, have been summoned to testify. It is said that the Commission will take similar action at Omaha, Kansas City, St. Louis, Cincinnati and New York. It is said that the sale of 4,000 tickets to a St. Paul broker by the Chicago, St. Paul & Kansas City, recently referred to in these columns, will be a prominent subject of investigation; also a charge against the Minneapolis & St. Louis of making a contract with steamship agents for carrying emigrants at less than tariff rates.

Live Stock Traffic at St. Paul.

The business at the South St. Paul stock yards in 1890 is shown by the following statement of receipts:

Railroads.	Cars.
Chicago, Milwaukee & St. Paul.....	1,239
Chicago, St. Paul & Kansas City.....	1,926
Minneapolis & St. Louis.....	724
C. & St. P. M. & O.....	2,081
Great Northern.....	2,051
Northern Pacific.....	1,444
Burlington & Northern.....	134
Soo Line.....	92
St. Paul & Duluth.....	62
Total.....	9,783
Increase over 1889, 37 per cent.	

Flour, Grain and Provision Shipments from Chicago in 1890.

The report issued by the Chicago committee, of the Central Traffic Association, giving the statistics of flour, grain and provision shipments, through the Atlantic

seaboard for the year 1890, shows a total of 2,096,854 tons, against 1,537,190 tons during the year 1889, an increase of 559,664 tons. The various roads carried as follows:

ROADS.	Flour.	Grain.	Provisions.	Tons.	Per cent.
C. & G. T.....	11,991	264,662	91,430	368,083	17.6
M. C.....	15,956	212,209	127,171	355,336	18.4
L. S. & M. S.....	18,244	274,369	70,436	363,049	17.4
P., Ft. W. & C.....	55,244	173,509	65,506	294,259	14.0
P., C., C. & St. L.....	9,626	107,652	23,141	140,419	6.7
B. & O.....	34,293	140,555	67,165	242,013	11.5
N. Y. C. & St. L.....	14,704	224,436	63,693	302,833	14.4
Total.....	160,028	1,427,374	509,452	2,096,854	100.0

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Jan. 10, amounted to 92,597 tons, against 77,397 tons during the preceding week, an increase of 15,200 tons, and against 131,793 tons during the corresponding week of 1890, a decrease of 39,196 tons. The proportions carried by each road were:

	Wk. to Jan. 10.		Wk. to Jan. 3.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	12,446	13.4	10,695	13.7
Wabash.....	5,764	6.2	6,282	8.1
Lake Shore & Michigan South.....	16,406	17.7	10,825	14.0
Pitts., Ft. Wayne & Chicago.....	8,580	9.3	7,499	9.7
Chicago, St. Louis & Pitts.....	9,016	9.7	9,212	11.7
Baltimore & Ohio.....	7,090	7.7	4,622	6.0
Chicago & Grand Trunk.....	15,252	16.5	10,011	13.0
New York, Chic. & St. Louis.....	10,241	11.8	8,557	11.1
Chicago & Erie.....	7,132	7.7	9,784	12.7
Total.....	92,597	100.0	77,397	100.0

Of the above shipments 6,761 tons were flour, 48,020 tons grain, 5,432 tons millstuffs, 6,480 tons cured meats, 3,575 tons lard, 9,099 tons dressed beef, 1,084 tons butter, 2,689 tons hides, 135 tons wool, and 4,086 tons lumber. The three Vanderbilt lines together carried 42.0 per cent, while the two Pennsylvania lines carried but 19.0 per cent.

By-Laws of the Western Traffic Association.

The meeting of Western railroad directors in New York Jan. 8 was made up of representatives of the Atchison, Topeka & Santa Fe, Chicago & Northwestern, Chicago, Burlington & Quincy, Chicago, Milwaukee & St. Paul, Chicago, Rock Island & Pacific, Denver & Rio Grande, Great Northern, Illinois Central, Iowa Central, Missouri Pacific, Northern Pacific, Rio Grande Western, Southern Pacific, Union Pacific and Wabash roads. A code of by-laws was adopted, which, after reciting the resolutions of the meeting of Dec. 15 (printed in the Railroad Gazette of Dec. 19), goes on to say:

Whereas, Said resolutions have been formally ratified by the respective Boards of Directors of the companies named, now, in order to carry out the design and fundamental principles of the foregoing, the following by-laws are hereby agreed to by the members of said Advisory Board; the Wabash Company being represented for that portion of its line from Chicago to East St. Louis and west of said line, and the Southern Pacific Company represented only for that portion of its lines west of the Mississippi River.

ARTICLE I.

The name of the association shall be the Western Traffic Association, and the office of the chairman of its commissioners shall be in the city of Chicago.

ARTICLE II.

Except as hereinafter specifically provided, the business to be covered shall be all the state and interstate traffic, both freight and passenger, which is competitive between any two or more of the members of this association, having origin or destination in Illinois, Minnesota, Wisconsin and Peninsula of Michigan, or any state or territory west of the Mississippi River, except business passing between points north of the Ohio River and points south thereof, both of which are east of the Mississippi River. The business to or from the Republic of Mexico via the Rio Grande crossings shall be included.

Provided that business to and from transpacific ports is excluded, the association having control of the routing of the same east of the Mississippi River.

ARTICLE III.

The Advisory Board shall meet quarterly on the second Tuesday of January, April, July and October each year; the January and July meetings shall be held in the city of New York, and the April and October meetings in the city of Chicago.

Special meetings of the Board shall be called by the president whenever in his judgment necessary, or upon the request in writing of any three members of said Board, giving at least ten days' notice of the time and place of such meeting.

The records of the meetings of the Advisory Board shall be kept by its secretary, and the proceedings shall be promulgated by him for the information of members.

ARTICLE IV.

The following officers shall be elected by ballot at the January meeting in each year by four-fifths of the members: President; Finance Committee; four or more Commissioners, one of whom shall be named as Chairman.

ARTICLE V.

The President shall be a member of and shall preside at all meetings of the Advisory Board.

ARTICLE VI.

The Finance Committee shall consist of five members of the Board. It shall elect from its number a Chairman, who shall preside at its meetings, and, in case of the absence of the President of the Advisory Board, shall act as President pro tem. It shall control all disbursements, authorize the employment of necessary clerks and other assistants required by the Commissioners.

ARTICLE VII.

SECTION 1. The Commissioners shall adopt such measures as will tend to secure uniform, stable and reasonable rates, prevent unjust discrimination and enable each line to carry its fair share of the competitive traffic.

SEC. 2. On the application in writing to the Commissioners by any interested company for its share of the competitive traffic, either freight or passenger, or both, of any one or more specified points, or of any designated territory, the Commissioners shall make an equitable division thereof between the interested lines upon such basis, and in such lawful manner as they deem advisable, subject to revision by the Commissioners after full investigation.

SEC. 3. The Commissioners shall have power, and it is hereby made their duty to establish a Bureau for the collection and

The principal features of these resolutions are that the Advisory Board shall have entire charge of all outside agencies for securing traffic at competitive points, discharging agents who cut rates, and "shall appoint proper arbitrators, commissioners and other representatives," and that no company shall withdraw from the association except on ninety days' notice, and not before July 1, 1891, in any event.

preservation of such information and statistics as may be necessary to enable them to execute the powers conferred and to perform the duties imposed upon them. To that end they shall be furnished with copies of all way-bills and reports of traffic when called for, and shall have authority themselves or by designated subordinates to examine and check all books, accounts and vouchers in relation to traffic, subject to this agreement.

SEC. 4. All violations of the agreement or failure to comply with the orders of the Advisory Board or of the Commissioners, by any member of the association or any officer or representative of such member, shall be reported to the Advisory Board for such action as it may deem expedient.

SEC. 5. The Commissioners shall have power to establish and promulgate, from time to time, rules and regulations for the orderly conduct of the proceedings before them, and change, add to and repeal the same.

SEC. 6. Applications to the Commissioners for relief shall be promptly investigated and determined, reasonable opportunity to be heard being given to all parties interested. In cases of extreme urgency the matter may be determined without a previous hearing, all members interested being first notified of the proposed action.

SEC. 7. In order to meet competition of lines outside of the association the Commissioners shall, on the application of any member, make such immediate temporary change in the rates, divisions, rules or regulations affecting any one or more of the interested lines as the Commissioners may deem necessary and expedient, first notifying all interested parties, and they shall at once convene the Rate Committee of the interested lines for further consideration of and action in the matter.

SEC. 8. The Commissioners shall apportion the expenses of the association among the members, render monthly statements thereof and make drafts therefor.

SEC. 9. The action of the Commissioners shall be by unanimous vote, except as hereinafter provided in Article VIII, in all matters pertaining to the apportionment of traffic or the establishment of, or a change in, rates, divisions, rules or regulations. In other respects a majority vote may control.

SEC. 10. The Commissioners shall have authority to construe these by-laws and all resolutions which may be adopted; their decision shall be binding until reversed by the Advisory Board.

ARTICLE VIII.

The traffic manager, general freight agent, general passenger agent or other duly authorized officer of the respective companies, members of this association, shall constitute, respectively, the freight rate and passenger rate committees for the territories or districts within which their respective lines are interested, but all action of the rate committees shall be reviewed and approved in writing by the general manager or highest traffic officer of the interested members before becoming operative. The establishment of or changes in rates or divisions or rules or regulations governing the rates of the territory of the association, shall be effective when so ordered by said rate committees.

If differences arise, the question at issue shall be referred to the Commissioners for determination; provided, however, the members of the Advisory Board for any interested company may, after giving the Commissioners an opportunity to be heard, have power to give 30 days' notice of such change in the rates, divisions, rules, or regulations, as they believe the interests represented by them require, and the date it shall become effective.

ARTICLE IX.

SECTION 1. The territory served by the lines parties hereto shall be divided into four or more sections or divisions, observing as nearly as practicable the natural divisions of the territory as represented by existing associations, and each division may be put under the immediate supervision and direction of one of the Commissioners chosen.

SEC. 2. It is understood that, concerning traffic the competition for which is limited to two or more members hereto, the interested members may, by agreement, govern and control it without the intervention of any of the agencies of this association; provided, that upon the application of any member hereto the Commissioners may decide who are the interested parties, subject to the right of appeal to the Advisory Board; further provided, that all agreements and rates between such companies shall be filed with the Board of Commissioners before becoming effective.

ARTICLE X.

SECTION 1. The division of through rates on the traffic subject hereto, excepting Transcontinental Association traffic, whether between lines members of the association or between lines in the association and outside companies, shall be arranged by the association; provided, however, that when one company has a proprietary interest in or controls or leases another the divisions between such companies shall be what they elect and shall not be the property of the association; provided further, that as regards traffic contracts at this date actually existing between lines not having common proprietary or other interests as above, the same shall be reported, so that the divisions with competing lines may, if thought advisable by such competing line, be made on equally favorable terms.

SEC. 2. Certified copies of all contracts now in existence which may in any manner affect or control rates or divisions upon any traffic included herein shall be filed with the commissioners forthwith.

ARTICLE XI.

SECTION 1. Any member aggrieved by any action or determination of the Commissioners or non-compliance therewith by the Advisory Board, which shall at its first meeting thereafter, either regular or special, make final disposition of the same; but such appeals shall not stay the execution of the action or determination appealed from. Should the Advisory Board reverse or modify the action or determination of the Commissioners; such restitution shall be prescribed in the order of modification or reversal as the Advisory Board may deem proper.

SEC. 2. Any member affected by any act or determination of the Commissioners made without an opportunity to be heard may apply for a hearing, with a like right of appeal.

SEC. 3. The Commissioners in their discretion may allow a stay of execution of the order pending an appeal to the Advisory Board.

SEC. 4. If an appeal should not be determined by the Advisory Board within sixty days from its completion, in cases where the action or determination appealed from involves a change of rate, division, rule or regulation, or the apportionment of traffic, the order or decision so appealed from shall then be suspended, and the conditions previously existing, so far as changed thereby, restored until the determination of such appeal.

SEC. 5. An appeal taken more than 60 days after notice of the order or decision appealed from may be dismissed by the Advisory Board upon its own motion, or on motion of any interested member of the Association.

SEC. 6. An appeal shall be complete when a notice subscribed to by either the President, Vice-President, the General Manager or Traffic Manager of the appealing party, and describing with reasonable certainty the action, determination or order appealed from, shall be filed with the Commissioners.

SEC. 7. Upon the filing of the notice of appeal to the Commissioners, the latter shall furnish to each member of the association a copy thereof, to the end that such member may have an opportunity to be heard upon the trial of such appeal.

ARTICLE XII.

The rates and divisions of same affecting traffic covered by this agreement, duly established and in effect on the 31st day of January, 1891, under existing associations and the rules and regulations governing same as provided by said associations, except as modified herein by these by-laws, shall continue in force until changed as herein provided.

ARTICLE XIII.

Nothing herein contained shall be construed as depriving any railroad company, party hereto, of any of its charter rights, or as relieving it from any of its charter obligations; and it is expressly understood that these by-laws govern such traffic only as may be lawfully embraced therein, and the Commissioners, finance committee and all officers and agents charged with any authority or duty under them are hereby required to so construe the same.